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Headquarters, Scientific Session and Banquet, June 2, 1917

HOTEL McALPIN
New York City

Surgical and Anesthetic Clinics, June 4, 5

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AMERICAN
JOURNAL OF SURGERY

VOL. XXXI. MAY, 1917 No. 5.

THE BIOPSY: HOW THE SURGEON MAY CONTRIBUTE TO ITS DIAGNOSTIC VALUE.

B. G. R. WILLIAMS, M.D.,
PARIS, ILL.

Most surgeons are interested in tissue examinations. Many have recognized their value in controlling their work and in checking up their diagnoses, and have come to insist that they be done routinely. The instructions and advice which follow may be of some use to surgeons in large medical centers, but they are intended especially for the surgical specialist who desires or is forced to send the tissue by express to some distant pathologist. For it is certainly true that there are today comparatively few men who are expert in tissue work. A very large per cent. of our practical laboratory workers being recent graduates, they are not qualified nor are they usually willing to venture opinions until after they have had several years of experience.

And so the usual arrangement is as follows: The surgical specialist secures, preserves and sends the material to a pathological specialist, who examines it and returns an opinion usually in the form of a technical report which is filed away with the hospital records.

The smaller hospital is coming into its own. Practically any county can support a hospital and one or more men who give most of their time to surgery. Many of them can provide plenty of laboratory work and fair salary to a general laboratory man. But few communities can support an experienced tissue pathologist.

Inasmuch as surgeons continue to insist upon dependable work and demand opinions from experts (ofttimes the opinion of several men is asked), it is necessary that they understand in general the methods of securing, preparing and preserving tissues that they may be properly handled after reaching the laboratory.

Any tissue pathologist will concede that a certain number of specimens sent to him within a given time, are unfit for examination, and that an intelligent opinion is quite impossible. It happens, moreover, that the sectioning must be completed and staining methods applied, before this fact can be ascertained, and that it can be finally concluded that a diagnosis would be hopeless or unjustified.

The most frequent annoyances are specimens which prove to be sloughs, blood clots, mucus and other materials which contain no tissues. Failure to add preservatives results in desiccation or post-mortem digestion or putrefaction, and renders examination well nigh impossible or reports misleading. The sending of large masses of tissue with small lesions which have not been marked, adds needless work and often confusion. Neglect upon the part of the surgeon to include instructions, frequently leads to misunderstandings.

SELECTION OF MATERIAL.

In general the following rule holds. Solid, living tissues should be secured whenever possible. A tissue, it must be understood, need not be normal to be living. Necrosis is a rather late event in all tumors, inflammations and other lesions. But disappointment is almost certain to follow when sloughs or obviously dead matter are sent. Friable, desiccated or pultaceous materials which have already separated from the living tissue, or may be loosed with ease, and represent the last stages of retrograde alterations, are usually "too far gone" for examination. There are a very few exceptions, very few. Now and then I have seen enough material picked by the finger from a cervical cancer, for a definite microscopic picture; but these instances are very, very rare. It is usually impossible to secure sections, the material may refuse to take the stain, or if it does take it, the picture is so blurred, misty, faint or confused that there is left a doubt in the mind of the examiner.

As a rule it is best to select the material from the periphery or base of the suspected neoplasm rather than from the center. We expect to find the retrograde processes further advanced in the center of the growth. Moreover, it is possible to demonstrate infiltration of normal tissues by morbid cells only by an examination of the periphery or base; and it must be remembered that the diagnosis of cancer is to be made not only upon the type of cells present, but also and mainly upon the relation of those cells to other tissues. Let it be repeated, *in suspected malignant growth, always secure material from the periphery or base of the suspected lesion* rather than from the center, although, if possible,

submit specimen from both the living tissue and the possibly degenerate or necrotic center.

Breast Tissue.—Very often an entire breast is sent to the pathologist. It may or may not be evident just which portion should be examined, and which bits should be selected for sectioning. The surgeon should always remember that preservatives alter the appearance of tissues somewhat, and that which may be obvious to his naked eye, may be obscured by the time the specimen reaches the laboratory man.

It is a very simple matter to mark those portions which he regards as especially suspicious, and it certainly means much to the time and patience of the pathologist. The best method that has come to my attention is the passing of marking sutures. These may be passed through suspected nodules and tied, and when a description of them is included with the instructions, a more valuable report is made possible. A moment's reflection upon the part of any surgeon, would make clear the fact that were every portion of the female breast sectioned and examined, the laboratory man would have about a month's job upon his hands.

Many surgeons clip out the suspected nodules or areas, and this is perhaps the better method. The report applies to this lesion and to no other portion of the breast. If, however, the opinion of more than one pathologist is desired, this lesion or these areas should be divided among them. It is unfair to all parties concerned to send haphazard portions of the breast to several men: it must not be expected that their reports will agree, for normal portions will be received by some and cancerous portions by others. This applies to all tissue work and may be illustrated by a common example. A pie may be sliced into a number of equal parts, and yet some of these parts contain no plums. Remedy —slice the plums.

Cervix Uteri.—The above advice holds very well for the securing and apportionment of the uterus or of any other organ to pathologists, and the following pertains more strictly to diagnostic examination of cervical bits and curettings for evidence of malignant alterations.

In the first place it must always be remembered that because the pathologist finds no cancerous areas in the specimen submitted (test slice of cervix curettings), the organ as a whole cannot be confidently dismissed as normal. This is not the fault of the pathologist nor may it be the fault of the surgeon. For some reason the malignant portion may have been missed by the scalpel or curet. Fortunately this does not often happen: in fact I do not recall a single instance in which it has occurred where the test excision or curettings were properly taken. Of course this applies to the question of carcinomata, malignant adenomata, etc., which involve the inner portions of the organ, but not to fibroids, etc., of the wall. I know of at least one case of sarcoma which was so missed, but it was located in the muscular coat of the uterus and could not have been reached by curettage, and this fact was appreciated by all concerned.

The advice to avoid necrotic tissues, sloughs, clots and mucus holds here as elsewhere. A mass cast off from or easily separated from this organ is as a rule dead and examination of it is a waste of time. Now and then the pathologist may be able to identify islets of chorionic tissue or surmise from the general makeup that he is dealing with a sloughing fibroid, but as a rule cancerous bits must be scraped from the endometrium of the body or clipped from the cervix.

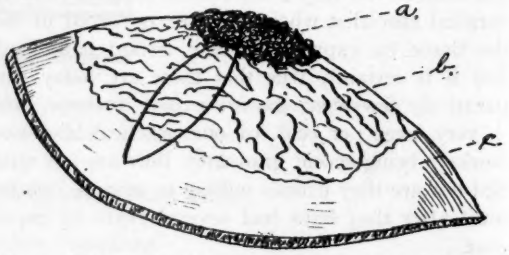

Fig. 1. Method of taking test specimen when the entire tumor cannot be submitted. a. Center of growth. b. Periphery of growth. c. Normal tissue.

My first intention in writing this article was to make it entirely original; and this has been an easy task, for I find but little in the literature upon my subject. These facts which I record have been suggested to me by years of experience and observation of many unfortunate misunderstandings and the reasons for such. However, I have come across one notable exception, and I wish to quote a couple of paragraphs from a book which really does give some usable advice in regard to test excision of the cervix. I quote from "Gynecological Pathology" of Abel-Bandler:

"No especial preparations are needed in making a test excision from the portio vaginalis. After introduction of the speculum, the vagina and external surface of the cervix should be thoroughly cleansed with a three per cent. solution of carbolic acid or with a 1 : 5000 bichloride solution. It is best first to irrigate the parts and then energetically wash them with cotton dipped in this solution.

"After fixing the anterior lip with the forceps, a wedge-shaped piece is cut from the desired area with Cooper's or any other angular scissors. Care should be taken to remove not only the affected

portion, but if possible, *to select an area which shows the transition from healthy to diseased tissue* [Italics mine, Williams]. The resulting bleeding can usually be arrested by packing with cotton, yet at times one or more ligatures may be needed. At any rate, it should be a general rule that the patient lie quietly for some time after, to convince one's self that the bleeding has entirely ceased, for in some cases, even after such a slight procedure, severe bleedings may result unless sufficient precaution has been taken."

Anent curettings, it is scarcely worth while to advise surgeons concerning the method for securing these. In some cases, however, it may be impossible to secure enough material for study, and here it is well to dilate the cervix sufficiently to insert a finger. Thus the pathological region may be felt with greater accuracy and a portion of this removed with the spoon curet.

Skin, Mucous Membrane of Lip, Tongue, Etc.—The general advice given above holds here. Do not be content to remove a necrotic center, but submit a piece from the periphery of the lesion.

INSTRUCTIONS.

Sufficient instructions should accompany every specimen. It is not necessary to give details in regard to symptoms, family history, habits of patient, etc., but it is well to state in brief the origin of the material, what is suspected and just which parts of the specimen are regarded as suspicious. Just here I hasten to say that some surgeons hold to the idea that such information is likely to influence the opinion of the pathologist, but I do not believe that this is true. A competent examiner lays but little stress upon a clinical diagnosis; the modern tendency, it seems to me, is rather in the opposite direction, viz., to pick a flaw if possible, in the clinical diagnosis. We see this more and more every day, and it is emphasized especially in autopsy work. At any rate, such influence is overshadowed by the aid given to the pathologist, and this works also to the advantage of the surgeon and patient. Pathologists, as a rule themselves in their ability to identify organs and tissues even when diseased; but now and then this little "game" works out badly for all concerned. A growth which may be normal or only semi-malignant in one location, may elsewhere be very malignant in character. I can give many examples, and these are only a few:—Fibrous polyp of the external auditory canal, is very likely to recur after removal (Adami); speaking of thyroid cancer, Mallory emphasizes the fact that its metastases may correspond in every way to normal thyroid tissue, and yet if the examiner knew that the material came from the lung or liver, he would not term it normal; the same authority in speaking of differentiating between fibroma and fibrosarcoma, points out that the dividing line is not always easy to determine, and emphasizes the value of demonstrating mitoses, a consideration demanding that the pathologist know whether or not the material is a tumor or a fibrous tissue repair. And there are other instances.

The surgeon should always indicate which portion of a large tissue specimen appeared to be suspicious before the preservative was added, and the suture method recommended above may be used in connection with the instructions.

Where a tumor has a definite wall, this should be included at least in part. I have seen at least one epidermoid cyst, the contents of which consisted of masses of fairly well preserved flat epithelial cells, and an examination of these alone, would have led to a decision of epithelioma. However the wall of recticular tissue declared the diagnosis.

Fig. 2. Method of marking by knotted sutures, the portions of the unpreserved breast, regarded by the surgeon as suspicious. The organ has been bisected to show the inner portion. For example, a single suture may be used if there is a single suspicious area or nodule. In case there are more, two sutures may be used to designate No. 2 and so on.

PRESERVATIVES.

This has always been a pet subject with me, and other tissue men hold very definite ideas in regard to preservatives and fixing agents. I prefer formalin always, and this solution should not be too strong. Very large masses of material should be incised at points to permit the formalin to permeate all portions. A ten per cent. solution is best, although I sometimes change this percentage after receiving the material. Formalin, relatively speaking, is a newer preservative; but daily it is gaining a place in the medical laboratory. It is a powerful and beautiful fixing and hardening agent. For many years I have emphasized the advisability of its use, but strange to say, the use of alcohol as a preservative has gained such a hold upon the average man, that about sixty per cent. of all speci-

mens I receive, continue to come in that liquid which prohibitionists and pathologists loathe. The chief objections to alcohol are:

1. It dissolves the contents of the erythrocytes.

2. It renders the membrana propria less distinct than does formalin.

3. Pathologists prefer constant pictures, and constant pictures depend upon constant fixation as well as constant staining. The picture after alcohol fixation is different from that given by formalin. I prefer the formalin picture.

4. Ten per cent. formalin means more than "any old per cent." of "any old kind" of alcohol: it means more constant staining. I have received tissues in wood alcohol, denatured alcohol and even in whisky.

5. Alcohol prevents freezing, and if a prompt opinion is desired, alcohol thwarts this. By washing out the alcohol (a procedure taking an hour or

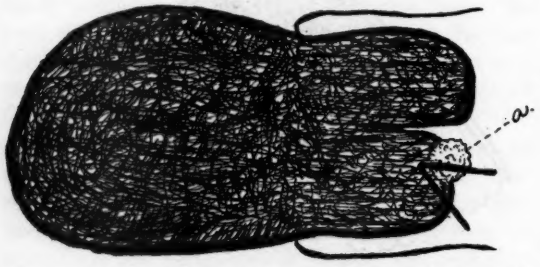

Fig. 3. Method of test excision of cervix. Shows how transition as well as diseased tissue should be secured. a. Suspicious nodule or erosion.

several hours) and substituting formalin (another two hours), the frozen sections may then be made and a semi-prompt report sent; but if the alcohol is left in the tissues, we must fall back upon the tedious celloidin methods and keep the surgeon waiting for two or three days. Since the freezing methods have become so perfected and refined, we are rarely justified in holding up a diagnosis in this fashion.

By all means, when sending a tissue to your pathologist, use ten per cent. formalin. His work will be more satisfactory. Very rarely should a tissue be presented and fixed otherwise, and then mainly for research work rather than diagnosis. I have made the statement that every tissue submitted in alcohol subtracts one year from the life of the pathologist, which of course is not true, for there would be no pathologists today.

CONTROLLING OPINIONS.

It is a general rule among tissue men that it is only the ignoramus who pleases to waste his time and money "trying out" the pathologist. Upon the other hand, the tissue man who professes to be supremely wise, deserves to be shown up now and then. Hippocrates, it is said, made few or no terse, dogmatic statements, but prefixed his opinions with the words, "It seems to me, etc." And after all, "tissue diagnoses" are but opinions, more valuable, it is true, than many other opinions, but opinions nevertheless. And in important cases, the surgeon may desire and is entitled to two or more opinions. The first pathologist may be chagrined that his opinion was not taken as final; but he must remember that we all make mistakes and that things are not always as they seem to be. Ofttimes I have witnessed surgeons persist until they found

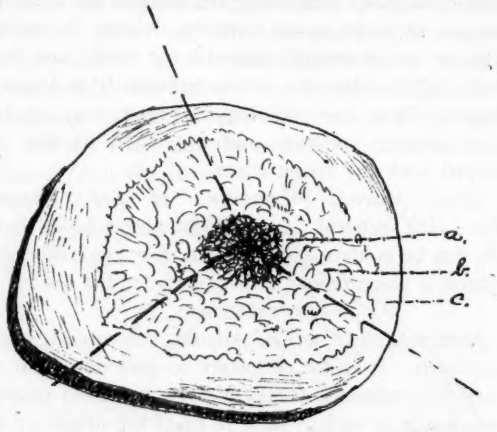

Fig. 4. Fair method for dividing suspicious skin lesion among three pathologists. a. Center in which retrograde alterations are likely to be advanced. b. Periphery, possibly infiltrated with living malignant cells. c. Surrounding zone of presumably normal tissue.

some pathologist who was willing to verify their clinical diagnosis, but patients can always find some doctor who will do as much for them; and the first man should not feel bad about it. There are very few "perfect days" for the student of tissue pathology. Moreover, contrary to common opinion, it has happened that the first diagnosis was after all, the correct one even though the second or last were ventured by some professor of pathology: I have seen it happen. Several years ago, a noted pathological clinic (this is not an experience meeting, but this instance is given to illustrate the above contention), showed me up to one of my clients, and I may or may not have deserved it. But my time came when a few months later they mistook a cancer for a benign growth. It was only human nature upon my part to feel a little relieved (not jubilant) about the matter, a feeling which most surgeons will appreciate, having experienced; although candidly, I am fair enough to concede that these pathologists were not given a square deal. They could not have reached such a conclusion had they been provided proper material, of that I will

always be confident. But can the surgeon see it that way? I feel that the average surgeon is coming to view the situation in the proper light.

A word further in regard to trying out the pathologist. This is a disgusting business, and no surgeon of any standing would stoop to it. By some it has been regarded as a joke, although the joker usually attempts to injure the practice of the pathologist. I will repeat that it is the observation of tissue men that the perpetrator is almost invariably a man of mediocre training and ability. One of the best advertisements (and laboratory men, as well as surgeons, like good advertising), that was ever pulled off for me, was done by one of these fellows who "caught me up" on a diagnosis of "stratified squamous cell carcinoma." The second diagnosis (and of course this was the correct one), was epithelioma. There was a good amount of talking done, but eventually some one must have tipped him off to the fact that he was making an ass of himself. I confess, moreover, that I have upon at least one occasion been puzzled by a specimen which never came from the human, and several years ago failed to diagnosticate cancer of an organ because a nearby gland contained no cancer cells and so on, but I have always collected my fees and refused to do other work for these men. Other laboratory men have doubtless been victims.

At other times, innocent ignorance may be held accountable. In a certain instance, one laboratory man was given a cervix, and the body of the uterus was sent to another. Of course their opinions did not coincide, but this was satisfactorily explained to the physician by the surgeon.

When it is desired to send a tissue to two or several pathologists, by all means see that each gets an equal portion of the lesion and of all parts of the lesion. If the entire specimen has already been sent to one pathologist, and it is not wished to take his opinion as final, ask him to return the material or at least part of it, and send it to others. In this connection, it should be remembered that such a request should be made promptly, for while some pathologists do so, they cannot be expected to keep specimens indefinitely. I have always made this point clear to my clientele, and do not obligate myself to keep any tissue or mount after the first day of the following month. Pathologists who follow a similar custom should also make this point clear to the surgeons for whom they work.

Your country is at war! Are YOU going to help it?

THE SUCTION APPARATUS IN SURGICAL OPERATIONS.

WALTER M. BRICKNER, M.D., F.A.C.S.,
Associate Surgeon, Mount Sinai Hospital.
NEW YORK CITY.

The employment of continuous aspiration or suction is fairly familiar in the drainage of the chest for empyema, of the bladder after prostatectomy,[1] etc. The usefulness of a suction device in the conduct of certain operations themselves is, however, not sufficiently appreciated. By its aid large collections of pus and other fluids can be speedily

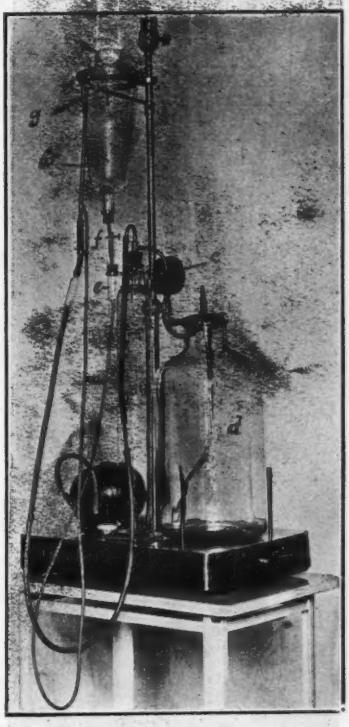

Figure 1. Kells suction machine, with attachment for irrigation, mounted on a metal base with handles for carrying.

evacuated, and cavities can be irrigated, without soiling the patient, the operating field and the surgeons. It affords the best means of clearing the throat of mucus during any operation under general narcosis. *It is life-saving in surgery upon the mouth and pharynx, and in laparotomy for diffuse purulent peritonitis.*

In all operations upon the mouth and upper air passages conducted under general anesthesia (adenoidectomy, tonsillectomy, resection of either maxilla, glossectomy, etc.), where it is of great importance to prevent the inspiration of blood, and in such operations without narcosis as the evacuation of a retropharyngeal abscess, a suction apparatus should

be regarded as an essential part of the surgical equipment. With a small aspirating tip blood and other fluids can be removed from the mouth and pharynx as fast as they appear. Mopping with

Figure 2. Kells suction machine, with attachment for irrigation, on a rolling base.

sponges is awkward and unsatisfactory, it often interferes with the operator, and it occupies the whole attention of an assistant and a nurse. Last year Wessler[2], Manges[3] and Lilienthal[4] recorded their respective roentgenographic, medical and surgical studies of several cases of pulmonary abscess that developed after tonsillectomy. It is unnecessary to elaborate the argument for a suction device as a live-saving and therefore essential part of the armamentarium in operations upon the buccal and pharyngeal cavities.

In bronchoscopic work a long, slender aspirating tip is necessary for clearing the field of fluid accumulations. Yankauer employs a small but sufficiently powerful electrically driven pump, and has developed to a nicety the technique of simultaneously irrigating and aspirating the bronchi in certain cases of pulmonary suppuration.

The prognosis in purulent peritonitis often depends largely, sometimes almost wholly, on the speed with which the operation is conducted. The indications are to deal with the source of the infection (ruptured appendix or pus tube, perforation of stomach or bowel) and to evacuate the accumu-

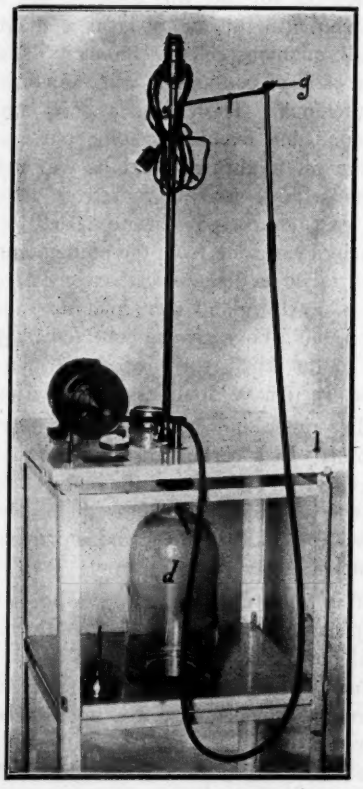

Figure 3. Kells suction machine permanently mounted on a table. Irrigating attachment omitted.

lated pus. If the pus is removed by mopping and sponging the time thus consumed, which, in the nature of the procedure, must usually be added to that occupied in treating the primary lesion, may unduly prolong the operation and quite turn the tide against the patient. With a suction tip the pus can be removed rapidly and automatically, *while the perforation in the bowel or the gangrenous appendix is being attended to*—a saving of many precious minutes that may well mean the saving of a life!

If the pus is not diffuse but is collected in the

pelvis the aspirating method is not as important, but it is none the less superior to sponging, in that it is more thorough, more rapid, involves much less traumatism, and frees a nurse from the task of preparing the "wipes."

For the rapid evacuation of blood from the abdominal cavity, e. g., in ectopic pregnancy, the suction device is likewise of great usefulness.

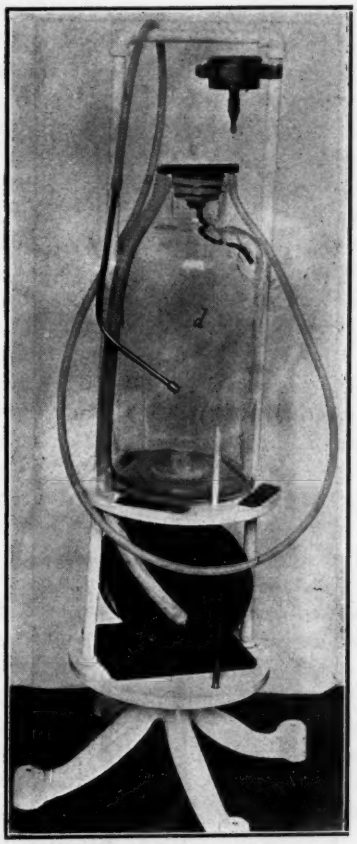

Figure 4. Special model of Kells suction machine on a rolling base.

Aspiration is performed through a suitable sterilizable metal tip (*vide infra*) leading the fluid through sterile stout rubber tubing to a vacuum bottle sufficiently large to contain all the evacuated liquid without overflowing into the pump. The latter may be a small "vacuum cleaner" apparatus, or an otherwise driven air pump of sufficient force and volume, or a Sprengel air pump attachment to a water or steam-pipe. Kenyon and Pool[5] described the employment of such a simple device on the Sprengel principle, using an "ejector" or a filter pump as an attachment to the water or steam-pipe or to the faucet, respectively. This device has several advantages: it is cheap; it is noiseless in operation; it is an inconspicuous, permanent attachment that can easily be installed in any operating room; it requires very little attention. In my own experience it has proven satisfactory. It is necessary only that the force and the volume of the flowing water or steam are sufficient. Kenyon and Pool state that the pressure must be twenty pounds.

Since September, 1915, we have used at Mount

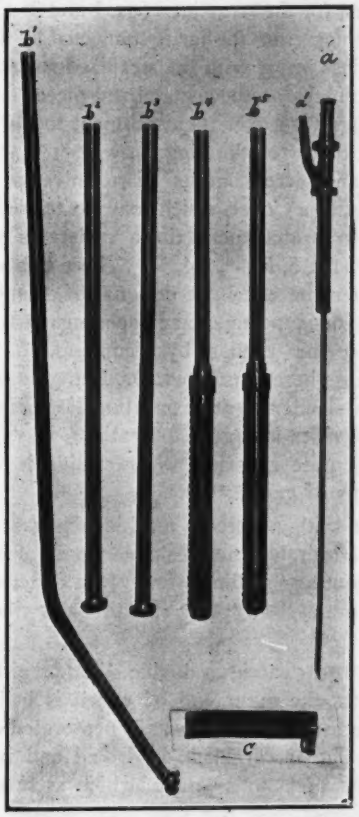

Figure 5. *a*, Universal stem for suction tips; the side arm, a^1, is for attachment of tubing from the irrigator. $b^{1, 2, 3, 4, 5}$, Suction tips (perforated shells fitting over suction stem). *c*, Coiled spring to prevent rubber tube kinking at *a*.

Sinai Hospital a movable electric suction machine kindly presented to me for trial by its designer, C. Edmund Kells, D.D.S., of New Orleans.

The apparatus consists of a 1-20 H.P. Emerson electric motor of 1800 r.p.m. and a vacuum pump built in a single unit, with but two bearings. The eccentric rotary pump, integral with the motor, bears two spring-governed vanes. It has no packings or valves and its power comes from the exactness with which it is machined. I have found that the apparatus needs no other attention than the precaution to put a little oil in the vents for the pump and the two motor bearings before using.

By means of a gauge (figs. 1 and 2, *c*) one can

determine in advance that all connections are tight. By turning a serrated nut the vacuum can be regulated to any desired degree, up to about 20 inches, as indicated on the gauge. The gauge and regulator are mounted on the piping connecting the pump with the wide-mouthed two-gallon receiving jar (figs. 1 to 4, *d*). When it is desirable to measure the aspirated fluid a smaller, graduated container may be substituted for the large jar (figs. 1 and 2, *a*). Stout rubber tubing from the jar is connected by means of a short glass insert with the sterilized rubber tubing that terminates at the metal hand-piece. A coiled spring (fig. 5, *c*) over its attachment to the tip prevents the tube from kinking.

The hand-piece consists of a universal suction stem (fig. 5, *a*) over which may be telescoped the desired perforated metal tip, a variety of which is provided (fig. 5, *b* [1], [2], [3], [4], [5]). These tips are fashioned after the excellent designs of Kenyon and Pool,[5] with supplementary openings to prevent injury to the tissues by "cupping." In addition to those here illustrated, Dr. Kells has made for me a very slender tip for aspirating blood from deep, narrow cavities in cranial operations, in which service it is quite superior to interminable mopping with strips of gauze.

To use with a suction machine he has also devised an admirable "non-leakable trocar" for emptying, without any spilling whatever, a distended gall-bladder or a cyst (fig. 6). It is thus described by its inventor:[6]

"This trocar carries a double-sliding and telescoping sheath, the outer end of which is bell-shaped, while the barrel of the trocar is perforated at stated places. The trocar blade is drilled and is carried at the end of a hollow tube, which in turn has an aperture.

"To use, connect rubber tubing from the aspirating machine to the outlet of the trocar and start the pump. Then, with the trocar withdrawn into the barrel, place the end of the barrel at the point to be punctured. Press the bell of the sheath firmly against the part, hold all firmly, and push the trocar blade down as far as it will go. By holding the sheath firmly, the barrel can be pushed in to any desired depth; then the trocar blade is rapidly withdrawn its full length, and the contents of the sac are quickly withdrawn by the aspirating device.

"Any fluid that may leak out around the barrel of the trocar is at once sucked into the bell-ended sheath and carried out with the rest of the fluid.

"Trocar blades of any desired shape or aspirating needles of any size or length may be used interchangeably in this device."

A unique feature of the Kells apparatus is the provision of a percolator (figs. 1 and 2, *b*), suspended at the top of a standard from which may be fed, drop by drop, normal saline, or any other solution to a point near the extremity of the operating tip where it is discharged *into* the suction tube. This solution mixing with thick pus or other fluid drawn into the head of the tip dilutes it and thus

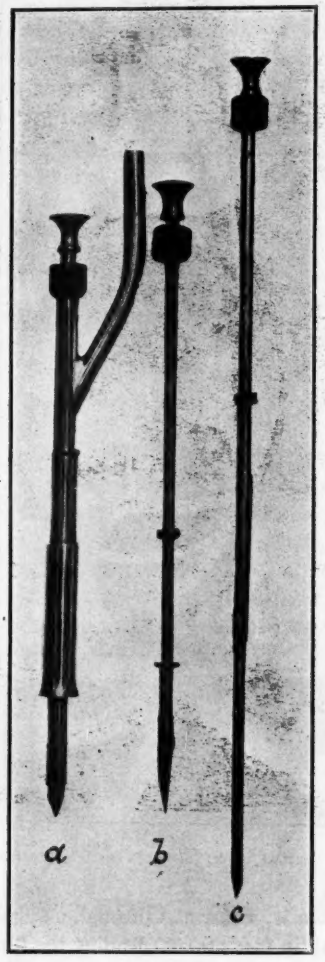

Figure 6. Kells non-leakable suction trocar for emptying the gall-bladder, etc. *a*, Instrument assembled, with trocar. *b*, *c*, Smaller trocars or needles, which may be used instead of the larger blade.

allows of the use of a low vacuum, a very desirable feature.

When the operator desires suction only, the solution from the percolator never flows out of the tip, but is carried into the receiving jar as fast as it is mixed with the fluid being aspirated. Upon the stem and the telescoping tips are two holes which can be made to register or not, at will. When plain suction is desired, the tip is slipped on to the stem in

such manner that these holes do not register, and the suction at the end of the tip will then not be interfered with. When intermittent irrigation is desired, these parts are put together so that the holes do register. The hand-piece is now held so that this opening may be closed with the finger, whereupon suction is exerted at the end of the tip. Upon removing the finger, air rushes in this opening and interferes with the suction at the end of the tip and the fluid will run out. In this manner, a few drops of fluid can be alternately allowed to flow out from the end of the tip and then immediately picked up, thus cleansing a part expeditiously and perfectly without danger of spreading infection. A sight feed (figs. 1 and 2, *e*) is provided so that the flow of the solution to the hand-piece may be constantly gauged. This is controlled by a compressor (figs. 1 and 2, *f*).

Excellent as is this device for intermittent irrigation and for diluting viscid fluids, I have not found it necessary in my own work, and I usually employ the apparatus without it (fig. 3).

By means of a sterilizable bracket (figs. 1, 2, 3, *g*) and switch key handle, the surgeon himself may manipulate the machine without assistance, if necessary.

Dr. Kells has made some modifications of his instrument, and he assembles its parts in various ways, as indicated in the photographs, to meet individual preferences.

The chief purpose of this communication is to supplement the reports of others on the usefulness of an aspirating device in various surgical operations and, especially, to emphasize its life-saving importance in operating within the mouth or pharynx and for diffuse purulent peritonitis. Incidentally, I would record the entire satisfaction with which I have for a year and a half employed the apparatus here described.

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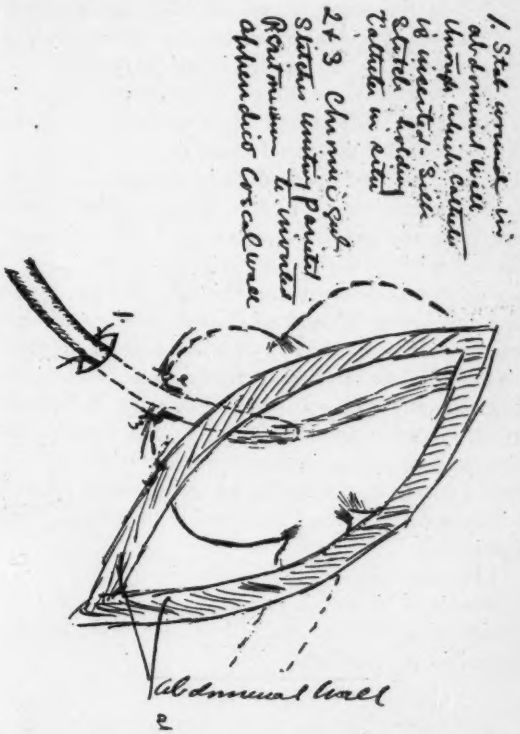
The Army and Navy need more doctors—lots of them! Have you offered your services?

APPENDICO-CECOSTOMY IN CASES OF FULMINATING APPENDICITIS WITH PERITONITIS.

R. H. JACKSON, F.A.C.S.,
MADISON, WIS.

There is a procedure which I have found of great value in cases of acute fulminating appendicitis with perforation and savage onset with progressive peritonitis, cases where it is evident at



operation that at very best the convalescence will be a stormy one, accompanied by marked abdominal distension with consequent disturbed cardiac action, vomiting and usually with great difficulty in getting the bowels to move, an event which is heralded with great satisfaction if it occurs, and dubious forebodings if it does not. I refer to the procedure of inserting a rubber catheter into the cecum through the stump of the appendix to which it is fastened with a chromic gut stitch and then inverted into the cecal wall by a purse string of fine chromic gut, the needle of which is then made to take a bite or two through the parietal peritoneum at the edge of a small stab wound in abdominal wall through which the catheter has been passed before placing it in appendix stump. The catheter is also fastened to the skin by a linen suture and connected by a tube to an appropriate vessel at the

side of the bed. This appendico-cecostomy permits:

1. The escape of large quantities of gas and lessens the abdominal distension and distress.
2. Permits the giving of normal saline directly into the head of the colon by the drop method.
3. The day after operation by giving a pint of hot saline rather quickly the presence of it in the cecum seems to relax the spasm of the ileo cecal valve and is frequently followed by a copious bowel movement. If necessary oxgall or other enema may be given with much more chance of success than by the rectal method.

I have used this procedure in eighteen cases and feel sure that it was of great benefit. While I have not seen any published account of this method I do not wish to claim any originality for it. My attention was directed to it several years ago by the late Dr. Arthur Wright, of Carroll, Iowa, who, having himself been afflicted with this type of appendicitis—the abdomen being greatly distended and the heart rapidly going to pieces under the embarrassment, related to me subsequently what a wonderful change took place in his condition within a few hours due to the sloughing or spontaneous opening of the appendix stump and establishment of a fecal fistula.

I have usually left the catheter in situ for a week or ten days. There is practically no drainage from its site after removal, the little wound being entirely healed in a few days.

THE AUTOPSY.

The autopsy is not to be regarded merely as a perfunctory procedure for the purpose of clearing up doubtful diagnoses, or indeed for the satisfaction of the demands of insurance companies. There should be, in connection with every autopsy, a study of the clinical history, and a careful scrutiny of the objective phenomena which had been described by internes, attending physicians, and consultants ante mortem.

The ability to perform an autopsy should be within the technical equipment of every practitioner of medicine, particularly those who practice medicine in far distant places or isolated from the advantages of hospitals and laboratories.

The general public is still moved by sentimentality, and violation of the human form may be objected to on religious grounds. The attitude of the layman must be considered, but the progress of medicine must not be hindered by conservatism, ignorance, or sentimentality.—*American Medicine.*

THE TREATMENT OF COLLES' FRACTURE CONSIDERED FROM THE STANDPOINT OF MUSCLE PHYSIOLOGY.

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Followig the work of Lane and Lambotte on the open or direct treatment of fractures, an enormous literature has appeared in recent years and has greatly stimulated interest in this much neglected but extremely important department of surgery. Naturally the treatment of fractures by the closed method has received a certain impetus secondarily, but the anatomic and physiologic factors operative in the production of deformity and the continuance of malposition, and the possibility of utilizing the traction of muscles inserting in the fragments as aids in maintaining a correct position after reduction have hardly received the attention they deserve.

It is the purpose of this paper to discuss rather broadly a few basic principles with regard to causation and retention of deformity on the one hand, and the mechanics of reduction and immobilization of fractures on the other, and subsequently to apply these principles to one of the commonest types of bone injury, namely, Colles' fracture.

In any fracture, aside from one which is impacted, the position of the fragments is determined (a) by the direction of the causative force, (b) by the direction of the planes of surfaces of the resulting fracture line and (c) by the action of overstimulated muscle upon the fragments themselves. In consequence, it is of the utmost importance to consider the various movements in all directions which the fragments may execute, the site of the fracture acting as a center around which the movement takes place. This immediately refers the problem incident to the reduction of the fracture to the realm of muscle physiology and necessitates a study of the action of the muscles upon the fragments, not as the muscles would act normally but as they determine position with reference to the newly formed point of motion. The problem of treatment therefore resolves itself into restoring bony continuity by bringing the fractured ends into apposition and placing the limb in such a position that equilibrium will be restored, if possible, between opposing groups of muscles to the end that the fragments be more readily restored to the anatomical and physiological norm; and in such a position immobilization apparatus should be applied. At all times the action of muscles upon the

fragments must be studied carefully in the light of the abnormal center around which motion takes place and the final position in which the part is immobilized must be governed in great measure by these considerations.

It may be well to cite three examples, two of which are matters of common knowledge, in order more definitely to explain the points above mentioned.

First, fracture of the greater tuberosity of the humerus. In this fracture, in which the greater tuberosity is torn from the bone, there is present an uncontrollable fragment, that is a fragment acted upon by a synergistic muscle or group of muscles with no antagonist attached to the displaced fragment. Thus the tuberosity is drawn upward and its lower extremity is abducted by the supraspinatus muscle and at the same time drawn backward and slightly rotated outward by the in-

Fig I. Side view of wrist (schematic). Tendons of extensor ossis metacarpi pollicis and extensor carpi radialis longior are shown passing beneath the posterior annular ligament.
A. Posterior annular ligament
B. Level of anterior annular ligament.
C. Tendon of extensor ossis metacarpi pollicis. arrow indicates direction of pull of muscle.
D. Tendon of extensor carpi radialis longior. arrow indicates direction of pull of muscle.
E. Radio carpal joint (site of normal motion).
F. Usual site of fracture (site of abnormal motion).

fraspinatus and teres minor muscles. Consequently it lies in a horizontal plane beneath the deltoid muscle instead of in its normal vertical plane. The lower fragment thus having lost its power of initiating abduction of the arm through loss of the action of the supraspinatus is, upon action of the deltoid, drawn directly upward in a vertical plane and further movement is hindered by the contact of the fragments against the under surface of the acromion process. Inasmuch as there is no possibility of reducing the upper fragment, the obvious thing to do is through manipulation of the lower fragment to bring the fractured surfaces into apposition and this is done by immobilizing the extremity in a position of abduction and slight external rotation.

A second type of fracture illustrating the point is that of the radius at the junction of the upper and middle thirds. Here the line of fracture is transverse and passes between the lower limit of insertion of the supinator brevis above and the upper limit of insertion of the pronator teres below. Stimulation of these muscles by the fracture gives rise to spasmodic contraction of each, and as a net result the upper fragment is drawn into a position of hypersupination, that motion being no longer limited by the pronators and lower portion of the interosseous membrane, while the lower is pronated by the action of these muscles. Furthermore, there is no pronator attached to the upper fragment, so the action of the supinator brevis is unopposed and the fragment is held in uncontrolled hypersupination. If, in addition, there has been lateral displacement due to trauma at the time of the injury, and this is usually the case, there is overriding of the ends of the bones due to contraction of the long muscles on the radial side of the forearm, namely, the brachio-radialis and the extensors of the radial side of the carpus. In reducing the fracture, the overriding of the fragments must be overcome by traction and because of the unopposed hypersupination of the upper fragment, the forearm must be held in hypersupination while the traction is being applied. If this is not done, the pressure exerted by the muscles

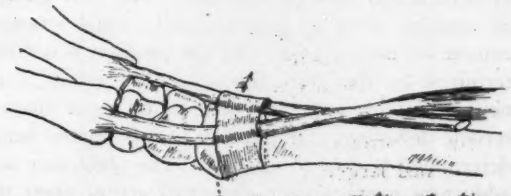

Fig II Side view of wrist (schematic). during slight contraction of muscles. Hand is being dorsiflexed. Arrow indicates direction of pull on posterior annular ligament.

of the forearm as soon as traction is stopped will lock the ends of the fragments and these will act as one bone during pronation and supination. Consequently if the lower fragment is in mid-pronation when reduced under traction, the ultimate result will be that mid-pronation will be the limit of the motion of supination after union has taken place for the supinator brevis will have to exert its maximum of contraction to obtain it, in view of the fact that it was contracted to its utmost when the fragments were reduced.

The third example, the displacement of the shaft of a bone upon the head and neck, namely, fracture of the neck of the femur, seems especially well adapted to illustrate the importance of the physiological factors alluded to above. In this injury, the line of fracture runs as a rule from above and externally downward and inward and is for the greater part at least intracapsular. The head and portion of the neck attached to it is held approximately in the anatomical position—usually slightly tilted forwards, and is but very slightly mobile because (a) of the shortness of the lever by which

it can be moved and (b) of the negative pressure within the articulation. The relative position of the great trochanter and shaft of the bone to the pelvis is markedly altered by the muscles attached to them. The muscles passing from the pelvis to the femur are all stimulated and in the normal condition this would result in muscle equilibrium, thus placing the thigh in the normal anatomical position. Acting through the false point of motion, however, the result is far different and may best be considered by taking up the action of the antagonistic groups of muscles: first, flexors vs. extensors; second, abductors vs. abductors; and, third, external rotators vs. internal rotators.

The flexors and extensors tend to draw the shaft of the bone directly upward, thus causing shortening of the extremity between pelvis and knee. The reason for this is that because of the solution of continuity of the neck there is now no connection between the shaft of the bone and the head, consequently the lever formed by the neck is of no value and the force exerted by the muscles is in a direction directly upward. The two groups of muscles being of approximately equal strength counteract each another and the position is not determined by the overaction of either group, i. e., neither flexion nor extension occurs as a characteristic deformity, the position in this regard being determined largely by gravity. The abductors and adductors exert a very abnormal action upon the thigh. The gluteus medius and minimus can no longer exert the power of abduction because of the solution in continuity of the lever which makes the action possible. In the normal condition, the neck of the bone acts as a lever of the second order and the contact of the head of the bone with the acetabulum the fulcrum—consequently a direct pull upward upon the great trochanter will cause it to move through the arc of a circle, the radius of which is equal to the distance between the center of the acetabulum and the point of attachment of the muscle. The shaft of the bone will thus be carried outward inasmuch as it is placed at an angle of 160° to the lever. In fracture, the normal lever being destroyed, the pull being exerted in an upward direction tends to carry the great trochanter, and with it the shaft of the bone, directly upward and draw the fractured surfaces past each another and thus there supervenes a second force tending to shorten the limb between pelvis and knee. The adductor group, which are not dependent entirely upon the neck of the bone for their action still exert a slight power of adduction, especially as they are no longer opposed by the abductors, at the same time the longer abductor muscles tend to shorten the thigh by the pull which they exert from above downward.

The action of the external and internal rotators offers a very interesting mechanical problem. Normally the external rotators are much stronger than the internal which latter comprise only the tensor fasciae femoris and the anterior thirds of the gluteus medius and minimus. In fracture, because of the loss of the action of the neck of the bone, the tensor fasciae femoris loses its power of internal rotation and aids the muscles mentioned above in shortening the thigh. In the normal condition, as Duchenne [1] has shown, the anterior thirds of the gluteus medius and minimus are abductors and internal rotators of the thigh, the middle thirds

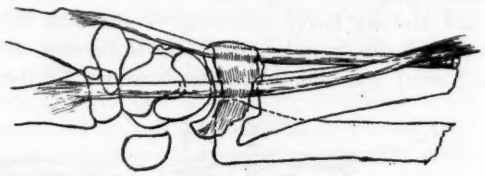

Fig III Tracing of radiograph of Colles' fracture. Forearm in position of pronation. The tendons have been inserted schematically to illustrate the action of the extensors of the carpus upon the lower fragment.

direct abductors and the posterior thirds abductors and external rotators. When the entire muscle mass acts, the anterior and posterior thirds neutralize each other and the resultant is direct abduction. In fracture, the entire muscle mass is stimulated and the resultant action is that brought about by the abductors as shown above. The internal rotators thus being disposed of, it remains to consider the true external rotator group. These being unable to act as true external rotators because of the loss of the leverage of the neck of the bone draw the great trochanter backward and inward, thus causing some external rotation as the fractured surface of the shaft rotates over the outer and posterior part of the upper fragment. This movement of external rotation of the shaft on its long axis is augmented by gravity acting with the weight of the foot. The resultant of all of the above forces is that the thigh is shortened and in a position of external rotation and slight abduction, while the upper fragment is pushed slightly forward by the lower fragment impigning on its posterior margin. The procedure advocated by Whitman of placing the thigh in a position of abduction and internal rotation overcomes the malposition, and immobilization in this position affords an antagonistic force to the muscles which are uncontrolled in their action, thus fulfilling the con-

ditions requisite for proper treatment of the condition.

The above examples illustrate the necessity for the study of muscle action upon the fragments in the light of the adventitious fulcrum present. It is purposed here to study rather fully the fracture of the radius known as Colles' fracture, which offers a problem similar to those quoted above, and particularly the example first cited, inasmuch as when studied with reference to the muscle physiology it falls into the class in which the smaller fragment is separated from the shaft and is acted upon for all practical purposes by one set of muscles only.

Fig. 4. Colles' fracture before reduction. Antero-posterior view.

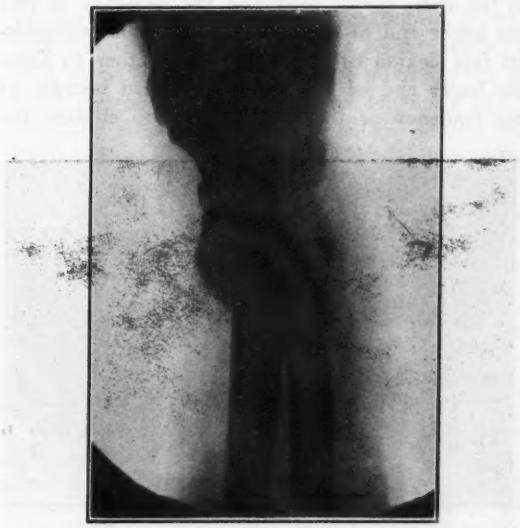

Fig. 5. Colles' fracture before reduction. Lateral view.

By Colles' fracture is meant a fracture of the radius occurring from one-half to one and one-half inches above the articular surface of the inferior extremity of the bone. The theories as to the etiology of the fracture are two: 1st. Tearing off of the lower extremity of the bone by a pull exerted through the anterior ligament of the wrist joint. This alone probably rarely causes the injury. 2nd. The dissociation of the causative force into two, i. e., in a fall on the palm of the outstretched hand the force exerted from below in a direction upward and backward upon contact with the ground, is divisible into two distinct forces,—first a cross strain and second vertical compression. The cross strain directed backward against the lower end of the bone tears it free from the shaft at its weakest point, namely, through the cancellous tissue at the junction of the shaft with the lower extremity, and moves the lower fragment bodily backward. The compression force acting vertically in the long axis of the bone drives the lower fragment upward and tends to impact and comminute the fragments. It is very probable that both the "arrachement" or tearing through hyperextension and the force directed obliquely upward and backward are, in many cases at least, instrumental in the production of the fracture. In the majority of cases in which displacement is present, the line of fracture runs from below and anteriorly upward and backward and from within, that is from the ulnar side of the bone, outward and slightly upward. In addition, the continuation of the vertical force impacts the posterior portion of the upper fragment and results in a tilting upward and backward of the lower fragment around a transverse axis. The vertical diameter of the anterior portion of the lower fragment is slightly shortened therefore because of the compression of tissue due to the impaction, and the same is true of the posterior diameter of the upper fragment, usually to a somewhat greater extent. Upon reduction of the fracture, there exists in consequence a gap between the anterior and posterior margins of the bones and the two fractured surfaces are convex and in contact closely only at their points of greatest curvature. This predisposes the fragments to tilt one upon the other, the direction of this tilting being governed by the direction of the pull of the stronger set of muscles governing the fragments.

Before proceeding to the consideration of the action of muscles upon the fragments, it is necessary to review in some detail the normal relation

of the muscles around the wrist joint and their action upon the lower end of the radius.

The mechanical arrangement of the muscles on the anterior and posterior aspects of the wrist joint differs very markedly when considered from the standpoint of their functional relationship to that joint. On the anterior aspect the muscles passing across the joint play through a pulley formed by the anterior annular ligament in front and the anterior surface of the carpus behind. The ligament is attached to the carpus, the outer extremity to the ridge of the trapezium and the inner to the hook of the unciform bone. Consequently the diversion of force when the muscles act occurs at a point distal to the radio-carpal joint and the tendency to pull the lower end of the radius forward is negligible. In fact flexion of the wrist tends rather to force the lower end of the radius backward because of the tendency of the long muscles to shorten the

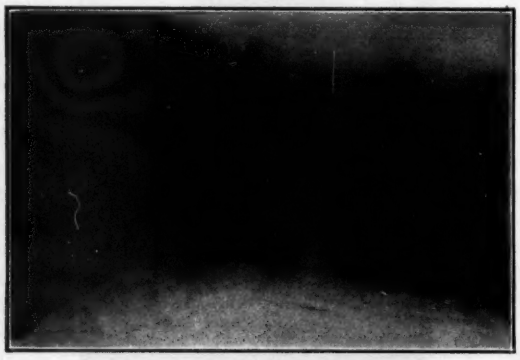

Fig. 6. Colles' fracture after reduction in supination. Antero-posterior view.

distance between carpus and humerus. On the posterior and outer aspect of the writ joint the arrangement of the muscles must be considered more in detail. Here the posterior annular ligament is attached directly to the lower end of the radius and forms compartments through which the various muscles attached to the bones of the hand pass. The radio-carpal joint is thus situated just distal to the pulley through which the muscles act and the force of the muscle action is exerted upon the deep surface of the annular ligament. Inasmuch as during extension of the wrist the tendons become angulated at the posterior annular ligament and contracted muscle endeavors to assume a straight line from point of origin to that of insertion, there must be a constant strain exerted upon the lower extremity of the radius in a direction from before backward and toward the radial side of the forearm. The muscles causing this strain are arranged as follows: On the outer surface of the lower extremity of the radius are the extensor ossis meta-carpi pollicis and the extensor brevis pollicis, the first of these arising in part from the posterior surface of the ulna and inserted into the base of the meta-carpal bone of the thumb. The extensor brevis pollicis arising from the radius and adjacent portion of the interosseus membrane may be left out of consideration here as it exerts but little effect upon the bone so far as the present problem is concerned. The next pair of muscles met with are the extensores carpi radialis longior and brevior which arise from the humerus, pass through a special compartment in the posterior annular ligament and are inserted into the second and third metacarpal bones, respectively. The action of the first of these is to extend the hand on the forearm and draw it toward the radial side, that of the second is direct extension of the hand. The extensor longus pollicis arises from the ulna and passes obliquely across the posterior aspect of the forearm, then through a special groove on the posterior surface of the lower end of the radius which is converted into a canal by the posterior annular ligament and finally is inserted into the base of the terminal phalanx of the thumb. This muscle extends the terminal phalanx of the thumb and the continuance of its action extends the hand on the forearm through the radio-carpal point. The extensor communis digitorum and extensor indicis arising from the common tendon of origin from the external condyle of the humerus pass through a separate compartment of the annular ligament and are inserted into the phalanges of the fingers. In addition to the above, the brachio-radialis arising from the external supra-condylar ridge of the humerus is inserted directly into the outer surface of the base of the styloid process of the radius. This muscle has a threefold action depending upon the position in which the forearm is placed when the muscle begins to act. When the forearm is pronated the muscle supinates to a position of mid-pronation, then becomes a flexor of the forearm and in consequence exerts a lateral strain on the lower extremity of the radius. When the forearm is supinated it becomes a pronator to the position of mid-pronation when it again assumes its action as a flexor of the forearm on the arm.

From the above it may be seen that the tendency of all the muscles passing over the lateral and posterior aspects of the wrist joint is to exert a strain on the lower extremity of the radius which tends to force this portion of the bone backward and toward the radial side of the forearm. (See figs. I and II.) The brachio-radialis, however, partially counteracts this tendency when the forearm

is in complete supination, for it then draws the lower end of the bone forward into the position of mid-pronation, though tending at the same time to carry it outward toward the radial side through its attempt to shorten the distance between the humerus and the styloid process of the radius.

When a fracture separating the lower extremity of the bone from the shaft is present it can be seen that the tendency of the muscles, because of the induced spasm, is to increase the deformity and, after reduction of the fragments, to predispose to recurrence. This recurrence is aided by two factors: (a) the sloping direction of the fracture line which allows the lower fragment to slide upward and backward upon the upper and (b) the convexity of the fractured surfaces which allows of only a relatively small area of contact between them.

Fig. III is á tracing of the fracture shown in

Fig. 7. Colles' fracture after reduction in supination. Lateral view.

figs. IV, V, VI, and VII to be compared with fig. II as it illustrates particularly well the above points. The patient, a male, aged 48 years, slipped and fell on an icy sidewalk striking on his outstretched left hand. He was admitted to the hospital one hour later. Figs. IV and V show the condition before reduction and figs VI and VII after reduction and retention according to the method to be described. It is interesting to note that in the antero-posterior view, fig. IV, before reduction, little or no deformity can be seen, and this is a very good illustration of the absolute necessity of taking roentgenograms in two planes or, better still, making stereoscopic roentgenograms.

The above facts being the case, the problem of treatment presents itself. Although the statement is frequently made that Colles' fracture properly reduced does not tend to recur and the result will be excellent irrespective of the form of retention apparatus used, the fact remains that on the average the result after a Colles' fracture with marked displacement is unsatisfactory from both functional and cosmetic standpoints. The period of convalescence is protracted and movements of the wrist, especially supination, are restricted permanently, though the function within the limits of motion may be good and the wrist fairly serviceable. The proof of the above lies in the records of the law courts—for with the exception of Pott's fracture, Colles' fracture is more commonly the cause of a lawsuit than any other.[2]

Inasmuch as the muscles acting most forcibly on the lower fragment, drawing it backward and rotating it outward on its long axis are situated upon the dorsal and radial side of the extremity, it seems that the indication is to shorten these muscles to their physiological limit and thus minimize the upward and backward pull on the fragment and at the same time offer an antagonistic muscle pull through the brachio-radialis, which, in the position of supination of the forearm becomes a pronator and thus tends to pull the lower fragment forward rotating it from behind forward around a vertical axis.

To ascertain the amount of shortening obtainable by this posture of the forearm measurements were made of the forearms of adults who had never had a fracture. The points selected for measurement were the external condyle of the humerus and tip of the styloid process of the radius. To obviate a change in the position of the tape measure, the points were marked on the skin in each case, and measurements were made in complete pronation and complete supination. It was found that in complete supination of the forearm the measurement was from 1.75 to 2 cm. shorter than in complete pronation and further that the shortening was a gradually increasing one during the act of supination. The explanation of this shortening is that in rotation of the head of the radius there is a lateral shift of the outer surface of the bone carrying it ulnarward away from the condyle of the humerus and as a consequence the measurement in supination represents the perpendicular leg of a right-angled triangle, while that in pronation represents its hypothenuse and is consequently longer. In addition to this the deviation of the long axis of the bone from the level of the bicipital tuberosity to the styloid process and the bowing outward of the shaft must be considered as adding to the lengthening upon pronation. This establishes the fact that in complete supination of the forearm, the muscles acting upon the lower fragment of the

fracture have a shortened distance over which to work and are consequently relaxed to the greatest degree possible and being so shortened their power of producing deformity is much lessened.

In order to establish the correctness of the above in the actual condition, a patient with a typical Colles' fracture with the line of fracture as above described was placed under general anesthesia and the fracture was reduced. The forearm was then laid upon the arm rest of the operating table in the position of pronation and the muscles lying on the radial and posterior aspects of the forearm stimulated to a mild degree with the faradic current. The result was the immediate recurrence of the marked deformity. The fracture was again reduced and the forearm placed in complete supination and the same muscles stimulated as before, using the same amount of current. The tendency toward recurrence of the deformity was markedly less than before and in fact was hardly appreciable. Stimulation of the brachio-radialis in this position exerted a distinct pull on the lower fragment in a direction forward with a concomitant rotation of the fragment on its vertical axis to the position of pronation.

The conclusions drawn from the above observations are that when the forearm is in supination the fragments are retained in position by two elements. First, the muscles which draw the lower fragment backward and upward and rotate it toward the position of supination are shortened to their physiological limit and can no longer exert a pull upon the bone sufficiently powerful to dislodge it after reduction, and second, the brachio-radialis being on the stretch because of its origin from the upper portion of the external supracondylar ridge and its direct insertion into the lower fragment on a plane lateral to that of its origin acts as an antagonist to the group just mentioned. Thus muscle equilibrium has been restored and the fragments tend to remain in place.

The methods recommended for the treatment of Colles' fracture, assuming complete reduction has been accomplished are many and vary from the simple adhesive plaster band about the wrist (Moore, Roberts) to the complicated traction and countertraction of Jackson. It is interesting to note that nothing is stated with regard to the position of the forearm with respect to pronation and supination. The majority of illustrations, however, figure the forearm in pronation with splints applied. Several years ago in the Roosevelt Hospital Out-Patient Department, New York City, it was the custom to put Colles' fracture up with the forearm in mid-pronation,[3] but the splints were not continued above the elbow and consequently the amount of hindrance they offered to pronation was slight.

During the past two and one-half years the following has been the procedure followed by me. The greater part of the work has been done in the Out-Patient Department and wards of the First Surgical Division of Bellevue Hospital, New York City. The opportunity to carry out the investigation was afforded by Drs. John B. Walker and Lucius W. Hotchkiss, who very kindly allowed me the privilege of caring for the cases of Colles' fracture admitted to their wards.

The technique of reduction and immobilization is as follows: The patient is anesthetized to the

Fig. 8. Method of dressing in supination, with anterior and posterior molded splints.

primary stage, nitrous oxide gas being used in the majority of cases and the impaction, if present, is completely broken up. This is accomplished in the following manner. The hand of the operator which corresponds to that of the injured wrist, grasps the hand as in shaking hands. The hand and wrist are then hyper-extended as far as possible, thus loosening the anterior portion of the fragments and increasing the deformity. The other hand of the operator then grasps the forearm at its lower portion just above the line of fracture. Traction and counter-traction are then applied, the hand of the patient being drawn into a position of marked ulnar abduction and at the same time the upper hand of the operator supinates the upper portion of the forearm while the lower hand slightly pronates the lower fragment, thus bringing them into as perfect alignment as possible. It may be necessary

at times to assist the pronation of the lower fragment by pressure with the thumb upon the lower extremity of the radius. The above manipulation is carried out two or three times in order completely to break up impaction and secure complete reduction. It has rarely been necessary to resort to more forcible methods, but if such occasion should arise, any of the grips referred to by Cotton[4] may be employed.

At the end of the manipulation the forearm is placed in complete supination and flexed on the arm at an angle of 90 degrees. The brachio-radialis exerts a slight action of pronation upon the lower fragment, and it is well to assist this action by slight pronation of the lower fragment on the upper, but it is essential that the upper forearm should remain in complete supination. In this position antero-posterior molded plaster splints are applied, extending from the metacarpo-phalangeal articulations to a point half way between the elbow and shoulder. (See figure VIII). In the early cases the first immobilization extended from midarm to the tips of the fingers as shown in the illustration, the terminal portions of the splints being loose to allow movement of the fingers, which is encouraged from the very first. Very shortly, however, this was given up, and the splints extended only to the metacarpo-phalangeal joints. It is essential that the splints include and extend above the elbow, for in this way only can the movements of pronation and supination be interdicted. At the end of one week the splints are removed and the site of fracture examined, and at this time the splints are shortened to the middle portion of the hand. At the end of the second week the proximal portions of the splints are removed to a point just distal to the elbow, and at the end of the third week the splints are removed entirely and the forearm carried in a sling for the fourth week, at the end of which time in many cases fair function has been reestablished, and at the end of the fifth week many of the patients have been able to do light work.

Early movement of the fingers is of extreme importance and should be urged from the beginning of treatment. After the splints have been cut down to a point below the elbow and pronation is again possible, a very good exercise is practicing upon the piano. In this series of cases massage has not been used in a sufficient number to draw any definite conclusions as to its influence on recovery of function. The impression gathered, however, is that its greatest benefit consists in relieving the myositis which develops in the muscles of the forearm, and even in those of the arm and shoulder.

In the above method of treatment I wish to lay great stress upon the fact that complete reduction is essential to a good result. There are many cases in which the fracture line is so serrated that this alone will prevent recurrence of deformity after reduction and the result will be good irrespective of the form of immobilization employed, hence the simple treatment of carrying the forearm in a sling, adhesive plaster band about the wrist, etc., advocated by different authors. There are, however, those fractures in which the fragments are similar in shape to those described above in which deformity will recur if the forearm is placed in pronation and the elbow left free even if complete reduction under an anesthetic has been obtained, and it is in this type of injury that the method here described appears to be of greatest value.

SUMMARY AND CONCLUSIONS.

1. The present methods of treatment of Colles' fracture leave something to be desired, as many of the results obtained in the hands of competent surgeons are unsatisfactory from both a functional and a cosmetic standpoint, and in some cases convalescence is unduly prolonged.

2. It would appear from a study of the surface form of the fragments and the action of the muscles upon them that there is a tendency toward recurrence of the deformity even after complete reduction of the fracture.

3. This tendency can best be overcome by placing the forearm in such a position as to lessen the strength of the pull of the muscles which reproduce the deformity and at the same time furnish an antagonistic muscle, and thus restore muscle equilibrium.

4. The position of the forearm, which fulfills the above indications, is that of complete supination, and therefore this would appear to be the logical position in which the forearm should be immobilized.

5. It is important to remember that supination of the forearm can be maintained only if the elbow is immobilized in addition to the wrist, and this can be accomplished by extending the splints above the elbow.

6. In the hands of the writer the above method used as a routine has afforded better results with less protracted convalescence than any other method heretofore employed.

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THE TECHNIC OF PROSTATECTOMY,

CONSIDERATIONS BASED ON A SERIES OF 81 CASES WITHOUT DEATH BY THE USE OF THE TWO-STEP METHOD.*

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Prostatectomy has become such a well recognized operation and the various methods of operation have been discussed so frequently that I cannot hope to contribute anything new to the knowledge of the subject. I shall only review some of the steps essential in this class of cases if speedy and complete recovery is desired.

Indications for operation upon the prostate are becoming better understood. When a patient over 55 years of age develops frequent urination at night he ought to consult his physician who will discover whether his condition is one of partial retention with the residual urine which causes the frequency. If his consultant is competent he will advise surgical intereference in preference to catheter life. The mortality from the use of the catheter is so high that the most mediocre surgeon can make a better showing by operation. Patients leading a catheter life show one hundred per cent. mortality.

Squier has contributed statistics of patients under his care which show that the average length of life after the use of the catheter had been begun, is two years and eight months.

It is variously estimated that from 33 1/3% to 40% of all men arriving at 55 years of age will have prostatic enlargement—that from 10% to 20% will require surgical intereference to save their lives. Just as it is impossible for the cook when she places the dough in the tin to prophesy upon which side it may fall or rise so it is impossible to say whether the adenomatous growth will back towards the rectum or push in and obstruct the urethra. It is summed up by saying that it is not the size but the shape of the tumor which causes the obstruction.

After surgical interference has been determined upon there are two principal methods of choice—perineal and suprapubic. Thanks to the early work of Fuller and those who have followed him, we have two well-defined and recognized methods. Fuller and Freyer have developed the suprapubic route which has later been improved by Squier, while Proust abroad and Young in this country have been the leading advocates of the perineal route. Each method has its adherents. In the hands of experts like these men there is little choice between the methods with regard to mortality.

Various investigators have demonstrated that the prostate is not hyperthrophied but that the enlargement is an adenomatous growth which has squeezed the prostate to the sides making it form a sort of capsule round the adenomatous mass. This mass may be shelled out without damage to the prostate or the genital organs. In the suprapubic operation the mass is simply lifted out leaving intact the bladder, the sphincter and the posterior lobe which latter contains the ejaculatory ducts. Suprapubic prostatectomy is thus in one sense a conservative operation as it leaves the prostate, while it is radical in that in removes the cause of the trouble and leaves no chance for recurrence.

In the perineal operation the mass is attacked through the posterior lobe which contains the ejaculatory ducts and the structure involved in the nervous mechanism pertaining to potency. The incisions are oblique and are intended to avoid these structures but we know that there are many anomalies and the position of these structures is often changed by pressure of the growth.

During the past fifteen years the mortality in prostatectomies has steadily decreased in the hands of experts until large series of cases have been reported with a mortality as low as three per cent. These statistics do not apply to the wards of general hospitals where the mortality is nearer twenty-five per cent.

The low mortality obtained by experts we know is not based upon selected cases but may be largely attributed to their attention to the details, however small, of preparation and aftercare.

Every surgeon aims to have his patient in the best possible condition previous to operation. Various methods have been adopted such as frequent catheterization at regular intervals, the indwelling catheter in the urethra, and suprapubic puncture, the last being really akin to the two-step operation. Since it is impossible to accurately diagnose the resisting power of various patients I believe that a method should be etsablished in which the greatest safety is guaranteed to the patient and which will be so simple that any competent surgeon can follow it.

Previous to June, 1914, the suprapubic operation was to my mind the one of choice. During the preceding three months three patients of mine had died, all of whom as far as discoverable were fair, if not good, surgical risks. After hearing Pilcher report on his method I decided that if it offered my patients greater safety I would adopt it. Since

*Read by invitation at a meeting of the New York Urological Society, December 6, 1916.

that time I have used the two-step method on 81 patients without a death. The details of some of these cases will be referred to later.

In fatalities from prostatectomy, the kidneys having been damaged by prolonged back pressure, death results from two causes as a general rule: acute renal infection (the patient often being in a dying condition when the surgeon first sees him), or gradual obstruction of the renal function.

The patient is uremic, often complains chiefly of cardio-vascular symptoms and the prostate has been entirely overlooked. These patients are often seen just prior to the period of breaking down when their general appearance is so good that they are operated upon without fear, but they possess so little resistance that they die without making any fight. This class of cases require the utmost care and attention with shock and hemorrhage reduced to a minimum.

One man whom I had the good fortune to see, was brought to the hospital practically on a stretcher. He had been under the care of different physicians for a year for cardiac trouble and colitis, his prostate not having been suspected. After a suprapubic drain was inserted under local anesthesia, he was treated for eleven weeks for his cardio-vascular and intestinal symptoms, after which time his general condition was markedly improved and his prostatectomy was completed. He made a rapid recovery and in two weeks returned to his home in a neighboring city. He has since resumed his position as a banker and is in excellent health.

These cases, with gradually increasing back pressure, complain very little of their symptoms. In any large hospital where autopsies are obtained, it is surprising to find how many cases that show more or less prostatic obstruction with dilated ureters and damaged kidney pelvis, have been treated for other conditions, attention apparently never having been called to any urinary trouble.

In this series of 81 cases without a death—which is not a series of selected cases—every case that needed prostatectomy was operated upon. Some of these men would certainly have died if the one-step method had been used. One case experienced such severe hemorrhage following the primary cystotomy that he was almost exsanguinated before the hemorrhage was stopped by packing the bladder. One month later the second step was performed without any complication and the patient made an uneventful recovery.

One old gentleman was so run down and uremic that he was almost like a piece of Dresden china. We always feared he would break while being handled. However, four weeks after the primary operation he went through the second operation with much less shock than he suffered at the simple cystotomy. He made a slow convalescence, mainly because of home-sickness, was sent home while the suprapubic wound was still draining and there he promptly improved and the suprapubic wound healed up.

Still another man, fat, flabby, and with a marked cardio-renal involvement—whose pulse dropped to 50 and lower on slight provocation, could not have survived a one-step operation.

Such cases should be given every chance. They are so frail and have so little resistance that it is only by reducing shock and hemorrhage to the minimum that they can recover.

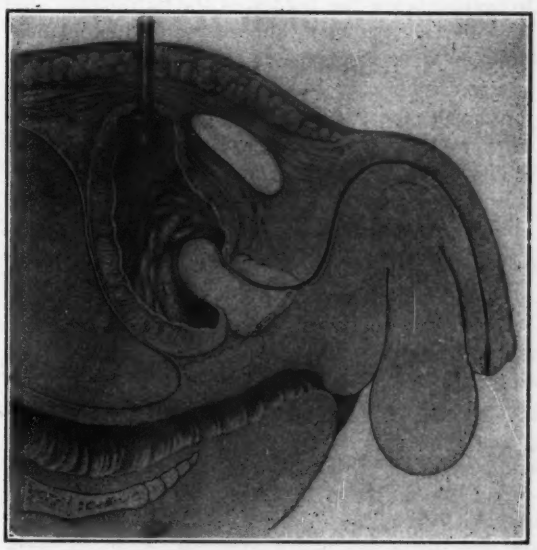

Fig. 1. Pezzer catheter in place after suprapubic cystotomy. This catheter makes a tight joint, is smooth and does not irritate the bladder mucosa. After Pilcher. (Courtesy of ANNALS OF SURGERY.)

In my series the ages of the patients were as follows:

50 to 59 years	3
60 to 69 years	48
70 to 79 years	26
80 to 85 years	4
	81

The average age was something over 65 years, the oldest 85 years and the youngest 54 years. Many of these men showed damaged kidneys from prolonged retention together with hardened arteries. As a rule they were poorly nourished and feeble, tired out from loss of sleep. The great majority had been leading a catheter life and had infected bladders. Calculi were present in nine

cases (11%). In this series there was no incontinence of urine, no tearing of the rectum, no fistula that would not heal. The case that remained open longest (11 weeks) had a suture as a focus and after this came away the sinus healed. The average wound closure was four weeks after the second operation. This time was reduced in the latter half of the series when the indwelling catheter was used after removal of the Pezzer catheter which is usually done at the expiration of ten days.

The two-step operation, made prominent by Lilienthal, has been popularized by Pilcher through the use of the large mushroom or Pezzer catheter. The primary operation is performed under local anesthesia, the suprapubic opening being made high enough in the bladder, as suggested by Squier, to be just below the border of the peritoneum, and the Pezzer catheter slipped into the bladder through an opening around which a purse-string suture has already been placed. A tight joint is thus made, the wound heals quickly, and, if necessary, we may wait for a week, a month or three months, until the patient is in good condition before proceeding with the second step. In my opinion this method is far superior to frequent catherization or the indwelling catheter with its accompanying traumation of the urethra and the ensuing urethritis.

If there has been a dirty bladder and infection of the wound occurs, the patient can withstand the infection much better than if it were an added risk to a prostatectomy. Nature, in self-protection, lines this opening with granulation tissue, and as it is only necessary to stretch this opening in the second operation, there is little risk of infection in this tissue during the removal of the prostate.

The patient may now receive cabinet baths, bowel washes, and whatever attention is necessary to care for his vascular system or other complications. It is highly important that patients should sleep at night, and by this method they seem to thrive through their ability to make up for previous loss of sleep.

The cystitis, which is usually present, may now be treated by silver nitrate lavage two or three times daily. The rapidity with which severe cystitis will improve under this treatment is surprising and a patient who has been septic from absorption of toxic material will respond most gratifyingly in increased appetite and general well-being.

In cases that have never been catheterized and have a sterile urine, we have found that with the greatest care infection soon follows. A number of cases have been reported where fatal results followed the first catheterization. It is this class of cases with the chronically distended bladder, and urine of low specific gravity, and where no great discomfort is complained of, that is most dangerous.

Now that the patient has been given the preoperative care suggested, how are we to know when he is fit for the second operation? The answer is best obtained by looking at the general picture. The kidney, which the tests at first showed much diminished, has increased, the appetite is better, the urine output has improved and become nearly normal, either a polyuria has been reduced or a scanty urine increased. As the function increases the patient usually presents a better appearance. Personally I rely a great deal on the phenolsulphonephthalein test, but reliance should not be placed upon these tests alone because we know operations have been successfully performed when the output remained low. It is most assuring, however, if the figures increase and appear within normal limits.

During the period of preparation the patient usually is occupied in the morning with cabinet baths, etc., and is up and about during the afternoon, and sleeps well at night. These cases show a marked change after a week's care. They are being trained for a fight and the more thorough the training the greater the resistance in the final combat. When they are prepared for the second operation the most important part is over.

The second operation is performed under general anesthesia and the time consumed is very short. The opening is usually stretched to admit two fingers and the prostate is shelled out in four or five minutes. The shock from the anesthetic is almost nil. Probably as many patients have died from hemorrhage, which has been called shock, as from any other cause. Hemorrhage can be obviated in various ways: first, and most important, by keeping to the line of cleavage; second, after flushing out with hot water, by the use of the Hagner bag, the hemorrhage may be controlled by pressure; third, the cavity may be packed with a long strip of gauze, the end being brought out through the drainage tube, or an indwelling catheter may be left in the urethra for drainage, and packing made around the catheter; fourth, by sewing up the edges of the torn bladder wall. This latter procedure, which has been attempted by various operators and has been more time-consuming than the operation itself, has been much simplified by the adoption of an ingenious retractor by Dr. Danforth of the Mayo Clinic. The retractor is easily inserted in a small suprapubic opening and a running suture readily taken where the bladder wall has been torn in removing the prostate.

This usually controls the greater share of the bleeding.

The drainage tube should be of sufficient size so that it cannot be plugged by a clot. I prefer the Marion because of its stiff wall and also the small tube attached which can be used for irrigation. In closing the wound, figure-of-eight sutures of silkworm-gut should be used, leaving the ends of the sutures long next to the drainage tube. The less irrigation and the least disturbance of the bladder following the operation the better. If left alone a clot will soon form. When continual irrigation was used, we did not realize just how much bleeding there was and by our irrigation we inhibited just what we wanted to have take place.

If Hagner's bag has been used, it is better to wait forty-eight hours before removal. If packing has been used and the end brought out through the Marion tube, we may begin to remove the packing at the end of 24 hours, pulling out that part which is loose, and repeating about every four hours until all comes away. On the third day, as a rule, the urine is clear, or but slightly tinged. The large Marion tube may then be removed and a large size Pezzer catheter inserted. The ends of the figure-of-eight sutures which are left long, may now be tightened up, and the wound strapped with adhesive plaster to give it support. In another twenty-four hours the bladder will have closed sufficiently tight around the tube so that the patient is dry, can get out of bed and move around quite comfortably.

Patients should sit up in bed on the third day and be out in a chair for an hour or so on the fourth. Men of advanced age do not do well if confined to bed, and should be stimulated to help themselves by getting out of bed early.

At this time a cork may be inserted in the Pezzer catheter and the patient told to void naturally, but he must not try to distend the bladder. The Pezzer catheter is left in the bladder until the wound is solid, usually at the end of ten days. The tube is then removed and the fistula heals in a few days. The healing can be aided at this time by inserting an indwelling catheter, so that the bladder will not be distended.

The comfort of a patient who is kept dry following operation is incomparable with the former method of letting the suprapubic wound fill up voluntarily. Even if the dressings were changed every two hours, the patient lay in a wet bed most of the time and the odor was most offensive.

Authorities are agreed that the preliminary preparation is of the utmost importance, that the kidneys must be relieved from the prolonged back pressure and must adjust themselves to the new order of things before prostatectomy can be safely performed. The first step of the two-step operation offers, I believe, by its freedom from shock—half of the operation over without general anesthesia—a superior substitute for the indwelling catheter or frequent catheterization, with its often unavoidable trauma. When the patient has been put in the best physical condition, the second step consists simply in lifting out the adenomatous mass, which takes but four or five minutes. Briefly the superior advantages of the two-step operation may be thus expressed: Little shock, little hemorrhage, little time, little risk.

Have YOU interested the young physicians in your community, fresh from the hospital, in the medical needs of the Army and the Navy?

FRACTURE DON'TS.

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A rather careful scrutiny of available surgical literature fails to reveal a single recent contribution to the subject of "Fracture Don'ts." The importance of this subject was brought forcibly to my mind several years ago, while assistant in the clinics of the late John B. Murphy, where we had the opportunity of seeing many unfavorable results of improperly treated and neglected fractures, such as ischemic myositis, deformities and resulting necrosis from impacted fractures, almost functionless arms and legs from fractures near the neck of the humerus, from Colles' fracture, Pott's fracture, angulation of the femur and tibia from faulty adjustment, etc., all of which could probably have been prevented by the application of proper treatment at the time of injury, plus the co-operation of the patient who is often at fault.

The two most important underlying principles in the treatment of fractures may be stated as: (1) Correction of the deformity by proper reduction of the fragments; (2) Retention of the broken bones in correct anatomic position by suitable dressing or apparatus until union has occurred. There are three essential factors in the successful treatment of fractures: (a) mechanical ingenuity, (b) anatomic knowledge, and (c) conservatism fortified by experience.

I believe we should treat all injuries, where frac-

ture is suspected, as a fracture, until the *x*-ray examination or the development of symptoms warrant the exclusion of fracture. It is my opinion, however, that the more conservative the surgeon is, the better will be his results; the operative work should be left for those who from experience and special adaptability are better qualified to secure favorable ultimate results,—I mean by this such procedure as bone plating, bone inlay, the use of nails, screws, etc.

Don't forget to dress a compound fracture in such manner that drainage can be instituted at any time, should the symptoms indicate or demand it.

Don't forget that the ability to correctly apply plaster of Paris dressings in the treatment of fractures must be acquired by every surgeon; it is not as easy and simple as one might think, it can only be learned by experience, the main objects being to secure fixation and rest without undue pressure.

Don't forget that a general anesthetic will cause muscular relaxation and facilitate the reduction of fracture in many instances where without its use reduction seemed impossible.

Don't attempt to apply any one kind of splint in a given fracture. Devise the kind of splint suitable for the individual case.

Don't forget to arrange all the fractured bones in their natural plane, with as much "muscle pull" removed as possible near the fracture site.

Don't forget that crepitus may be absent in: (a) riding of the fragments, (b) impaction of the fragments, (c) entire separation of the fragments, and (d) when muscle or blood clot is interposed between the fragments.

Don't forget that there is a pseudo-crepitus (very like true crepitus) in teno-synovitis, joint effusion, osteo-arthritis, and caries of joint surfaces.

Don't forget that in epiphyseal fracture the prognosis must be guarded, because such injuries in the young are sometimes followed by suspended growth or premature ossification followed by deformity.

Don't forget that in separation of the epiphysis (upper extremity of humerus and lower extremity of femur), the line of fracture is so broad that there may be no shortening, but the fragments may project.

Don't forget to at once examine the pulse at the wrist and ankle in fractures of the humerus and femur, to ascertain if an artery has been injured.

Don't allow a splint to press upon the skin sufficiently to produce ulceration or edema,—or what is worse,—gangrene.

Don't place a pad in the axilla or bandage the arm too tightly to the chest in fracture of the acromion, because the head of the humerus is thrown outward and may thus separate the fragments,—the head of the humerus is a natural splint in such fractures.

Don't forget to examine the shoulder joint in all fractures of the upper portion of the humerus, to ascertain whether the head is dislocated.

Don't begin passive motion too soon in fracture involving a joint, for it is likely to increase the formation of callus and thereby limit future usefulness of the joint; it is better to nail the fragments together and place the joint at complete rest.

Don't splint the palm of the hand in Colles' fracture; leave the fingers free so they may be "worked" after the second or third day, otherwise the tendons may become adherent where they cross the site of fracture and considerable time may be required to restore suppleness.

Don't make the diagnosis of "only a contused hip" in elderly people, without a careful and gentle examination (including the *x*-ray) to exclude impacted fracture.

Don't forget that rarely disintegration and absorption of the head and neck of the femur may occur in elderly persons as the result of chronic osteo-arthritis, which may simulate fracture in the shortening, eversion and osteophytic crepitus which are oftentimes present.

Don't use violence in attempting to elicit crepitus in hip fracture, as much damage may be inflicted by separating the impaction.

Don't keep elderly patients in bed trying to secure union in hip fractures; they are almost sure to develop pulmonary edema, pneumonia, sloughing from pressure of splints, or from bed sores, and nearly all of them die.

Don't forget to bandage the entire limb in fracture of the femur. I prefer the plaster of Paris cast reinforced with strips of tin, or the moulded plaster dressing. The splint should encase the foot, leg, thigh and pelvis, and a Buck's extension should be used.

Don't forget the danger to the popliteal artery from traction and extension in a transverse fracture of the femur above the condyle; an almost right-angle fracture box or splint is the best fixation dressing.

Don't place recent fractures in plaster of Paris without due regard to swelling; either place a wire saw underneath the circular plaster of Paris bandage, or cut it through from end-to-end when first applied, so it can be removed or readjusted when the swelling subsides; or what I like better in a great many fractures, apply moulded splints which

can be made any shape desired while wet and can be removed much more easily than the circular type.

Don't forget that should severe pain develop within a few hours after a splint has been applied, the splint is either too tight from swelling, or the fracture has not been properly reduced,—excepting in cases where a severe sprain complicates the fracture; if pain is caused by swelling and the splint be not removed, within a few hours degenerative changes are likely to occur in the muscle-cells which may induce ischemic myositis or (in the forearm) Volkmann's contracture. I have seen four or five such cases.

Don't forget to suspect degenerative changes due to syphilis, central sarcoma or other pathologic process producing friability of the bone, when fracture is produced by stepping upon a pebble or other slight violence.

Don't forget that in such instances there is usually a certain degree of anesthesia of the soft structures of the involved limb, and it may be difficult to prevent the patient walking too soon if a leg is fractured; and if the fracture is near a joint the condition may resemble a Charcot joint.

Don't fail to have an *x*-ray plate made in all fractures where perfect reduction seems doubtful, and this means nearly all of them; it is a valuable means of confirmation, and may be of great benefit to the surgeon should the result be unfavorable.

Don't attempt to plate a recent compound fracture, otherwise amputation will most likely be the inevitable result.

Don't use a plate in any recent fracture (week or ten days) until all means at hand have been exhausted in attempted reduction.

Don't forget that in plating or inlay work the strictest asceptic technic must be used, not even the gloved hand should come in contact with the wound or the wound-touching portion of the instruments.

Don't place too much reliance upon the *x*-ray plate in suspected fractures near the shoulder joint, and in fractures at the angle of the lower jaw, as good pictures of these localities are difficult to obtain.

Don't forget that painful passive motion is always harmful where fracture involves a joint.

Don't forget in placing any kind of a splint around or to the outer side of the knee, to pad well over the head of the fibula, as pressure is likely to injure the peroneal nerve, producing paralysis of the muscles supplied by it.

Don't forget to pad liberally under the heel of any splint that envelopes the foot, as pressure necrosis sometimes occurs. I have seen one such case in consultation following fracture of the patella, and healing was delayed for several months.

Don't forget to pad well over all bony prominences where splints have to be adjusted over them.

Don't forget that a burning sensation in the heel or other parts underneath a splint signifies that too much pressure is exerted; the splint should be immediately removed.

Don't forget that unless a fracture is complicated by a sprain, or severe contusion, when properly reduced and splinted pain should cease.

Don't forget the danger of injury to the anterior crural nerve in fracture of the true pelvis, since the fracture is most commonly through the ascending ramus of the os pubis at or near the point where the nerve crosses the bone; it is also likely to be injured in fractures and dislocations of the femur.

Don't forget that in fracture of the humerus there is danger of the musculo-spiral nerve being torn, and there is also danger of callus from the fracture interfering with the nerve.

Don't forget that in shoulder injuries complicated by dislocation, it is best not to attempt reduction of the dislocation until it has been ascertained no ribs have been fractured, for great damage might be inflicted upon the lung tissue should there be a broken rib.

Don't give a too favorable prognosis in any cranial fracture, for one never knows the extent of the crack in the skull, and infection may develop many days after the injury.

Don't forget that the auditory and facial nerves are frequently injured in fracture involving the middle fossa of the base of the skull and implicating the internal auditory meatus; when the nerve is divided permanent deafness will result.

Don't forget that the sixth nerve is more frequently involved in fractures of the base than any other cranial nerve, paralysis of which produces convergent squint.

Don't forget that in fractures of the skull the patient may present no evidences other than those of concussion for days or weeks, and then suddenly develop symptoms of an alarming or fatal character. One such case might be mentioned: A man was rendered unconscious by falling from a car and was taken to a hospital. There were no discoverable evidences of cranial fracture or local brain injury, and the next day as the patient was feeling perfectly well he was discharged from the hospital. He continued well for two weeks, then suddenly died. Autopsy revealed a transverse fracture extending the entire width of the middle fossa.

Don't forget when a person is found unconscious, with paralytic symptoms, with or without scalp

wounds, it is not always easy to determine whether the coma is apoplectic in origin, due to an extreme degree of intoxication, or the result of cranial fracture.

Don't forget that while the *x*-ray is not infallible, it is an invaluable diagnostic aid and should be used in all fractures, regardless of the anatomic situation, both before and after reduction.

Don't forget to carefully watch the patient suffering from fracture of the shaft of the femur dressed with circular plaster of Paris, as it may become loose from recession of the swelling; the patient may so rest in bed that his foot and leg may turn in the plaster and inversion or eversion of the foot occur.

Don't forget to be very careful in the remarks you make to the family or the patient who has a bad result following fracture, lest you be haled into court to testify against a brother doctor or practitioner. I once heard a prominent lawyer say that doctors themselves were responsible for the majority of suits for malpractice.

Don't forget that the majority of suits for malpractice have their origin in imperfect functional results or visible deformities following the adjustment of fractures; therefore in complicated cases the possibility of future impaired function should always be explained to the patient in the presence of competent witnesses.

Don't forget in ambulatory fracture of the lower extremities where crutches are necessary, to give the patient a good fit and pad the crutches well so as to prevent crutch paralysis from pressure upon the musculo-spiral nerve.

FINALLY: Don't forget that eternal vigilance is the price of good results in all fractures.

HEXAMETHYLENE TETRAMINE ("UROTROPIN") AS A FUEL.

There are many times when the physician needs a small, hot, sootless flame such as produced by an alcohol lamp, when he is out of reach of any such article. It is not generally known, I believe, that hexamethylene tetramine will give exactly this kind of flame when ignited. Two five-grain tablets such as are often carried in the physician's medicine case, will give a clean flame of sufficient heat to boil 5 c.c. of water in a test-tube within 30 seconds, and of sufficient duration to keep it boiling for two minutes. For boiling needles or small instruments, sterilizing water for hypodermic injections, testing for albumin by the heat-and-acid method, and many other similar purposes, this "extemporaneous technique" may be found useful.—LOWELL C. FROST, in the *Medical Record*.

THE CANCER CAMPAIGN QUARTERNARY: THE PROBLEM; THE PUBLIC; THE PATIENT; THE PHYSICIAN.

WILLIAM SEAMAN BAINBRIDGE, A.M., Sc.D., M.D., C.M.,
NEW YORK CITY.

(*Continued from the April issue*).

Whatever may be our individual interpretation presented by experimentation or by clinical observation, we have *no* incontrovertible facts to give to the layman who seeks enlightenment concerning the cause of this disease. We may have some negative findings; we may assert positively that cancer is or is not due to any kind of a parasite, microscopic, ultra-microscopic, or macroscopic; we may persistently deny that diet, of whatever kind, is potent to initiate the malignant process; we may agree or disagree concerning the proposition that cancer is or may be inherited; and we may accept or decline the oft-repeated statement that cancer is local in its beginning, and not in any sense a constitutional disease.

No matter what position we may assume with regard to the etiology of cancer, an army of opposition may be marshalled against us, equipped with apparently just as invincible weapons as we possess; for, truth to tell, neither side is really fighting, so far as the cause is concerned, with the impregnable armor of fact. Neither side, therefore, can vanquish the other. Even though one side may marshall seventy-five of a hundred thousand rats and mice against seventy-five or a hundred human subjects, in a contest of theories, who can say that either mice or men have won a victory?

How soon the smoke of battle may clear away and leave us and our allies, mice or men, triumphant, nobody can say. We can but hope that this consummation devoutly to be wished may soon be fulfilled. In the meantime, let us continue, in the laboratory or in the clinic, to fight for the possession of facts which will clear up this fundamental question—the cause of cancer. Pending the successful culmination of these efforts, how shall we interpret to the public Nature's "whispers" which come in answer to our investigations into the beginnings of this puzzling disease?

A few years ago, when so much was being said within the medical profession and in the secular press concerning the contagiousness and infectiousness of cancer, many of us were constantly confronted with anxious queries along this line, and with the serious and unfortunate difficulties which arose in the care of patients with advanced cancer.

We have not forgotten the urgent demands made by some of the radicals for the burning of clothing, bedding, and even houses in which patients with cancer had lived, nor have we forgotten the unwillingness and refusal of nurses and other attendants to take care of these unfortunates. This theory of the cause of cancer, like the poor, we have always with us, and this dread possibility, that after all, the disease may be transmitted from man to man, from animals to man, or even from plants to man, figures at times, in one way or another, in the literature concerning malignant disease. The theory has not been proved, nor has it been universally accepted as disproved.

What, then, is it safe to affirm, in this connection, in the promulgation of knowledge regarding cancer? All, it seems to me, that need be said is:

(1) That the contagiousness or infectiousness of cancer is far from proved, the evidence to support this theory being so incomplete and inconclusive that the public need have no concern regarding it.

(2) That the communication of cancer from man to man is so rare, if it really occurs at all, that it may be practically disregarded.

(3) That any relationship between cancer in animals and in plants to cancer in man, so far as the acquirement of the disease by man is concerned, is purely an academic question, an hypothesis so far from verification that even the "whisper" of it should not reach the public.

(4) That those members of the public in charge of or in contact with sufferers from cancer with external manifestations, or discharges of any kind, need at most take the same precautionary measures as would be adopted in the care of any ulcer or open septic wound.

(5) That in the care of patients with cancer there is much less danger to the attendant from any possible acquirement of cancer than there is of septic infection, or blood poisoning from pus organisms.

Of all the theoretic ghosts that stalk through the realm of cancer, however, the veritable Banquo's Ghost, refusing to be downed, is the ancient Constitutional Theory of the origin of this disease. It followed close upon the Evil Eye, the Curse, and other primitive ideas of the cause of disease, and it looms more or less vividly upon the horizon, its vestments varying with the times or with the "spotlight," cast upon it. Hand in hand with this ghost goes another, just now,—Heredity, an unintentional ally.

The combination is not an easy one to combat in the campaign of education, for a bewildering array of facts, figures and fiction have been collected by the supporters thereof. To be sure, the facts are not fundamental ones, the figures may be impugned as may all statistics, and the fiction is as interesting as any other fiction concerning this homely subject; the serious import thereof, however, has a bearing upon the treatment of the disease, as we shall see, and hence upon the campaign of education as applied to the layman. It is important, therefore, that a rational stand be taken concerning these theories of the origin of malignant growths by those who are earnestly endeavoring, without preconceived and biased views, to instruct the public in the matter of the eradication of this scourge. Is it not enough, then, to teach, in effect:

(1) That the hereditary and congenital acquirement of cancer are subjects which require much more study before any definite conclusions can be formed concerning them, and that, in the light of our present knowledge, they hold no special element of alarm.

(2) That in cancer, as in all other disease, attention to diet, exercise, and proper hygienic surroundings, is of distinct value, aside from any consideration of the essential cause of the disease.

(3) That suggestions which are put forward from time to time regarding the eugenic, dietetic and other means of limiting cancer, should not be accepted by the public until definitely endorsed by the consensus of expert opinion. Such consensus *does not exist* at present.

(*To be continued*).

ACUTE MAMMARY CARCINOMA.

Generally speaking, if an acute mastitis does not tend to clear up within ten days from the commencement of the disease, effort should be made to distinguish between this and the acute form of carcinoma. Both may begin with a localized area of redness and induration. In the former case, the nipple will usually be found to be the source of the infection. A rapid diffusion of the disease through the gland is noted in the latter case. The skin assumes a light or dark red color over its surface. Early axillary gland involvement may be seen in both cases and is not of great diagnostic importance in differentiating these conditions. Retraction of the nipple should be carefully looked for, though not present in all cases, is of great importance. The peculiar stony hardness, an induration due to infiltration of the tissues, usually both superficial and deep, is of the greatest importance in distinguishing these conditions and should be carefully sought.—M. E. LARMOUTH, in *The Canadian Medical Association Journal.*

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, MAY, 1917.

Wake Up, Colleague! Your Country Needs You!

Our peaceful country has at last been forced to take part in a war that has been thrust upon it. To assert our national dignity and maintain our national respect, is a high purpose that ought to rouse the patriotism of every American. A cause as just as ours cries out itself. For provocations much less we warred against England in 1812.

But there is at stake far more than the assertion and preservation of our national rights. This is not a mere quarrel among nations; it is not now only a war for supremacy in commerce or dominion. It is a clear-cut issue between militaristic autocracy and peaceful democracy. The divine right of kings and the iron rule of military caste, in their last weakening citadels, have arrayed against them the mighty force of the world's freemen. It is a fight to the end to determine for all time that individual liberty, not mass efficiency, is the measure of governmental benevolence. It is the old war, the greatest and perhaps the last of all the many wars for liberty and political equality, for which men have bled and died, and made glorious history.

Such a cause must stir in every fiber Americans proud of their country's history! It is a purpose larger than that of the American Revolution, which made us an independent republic instead of an autonomous colony of a democratic monarchy; an issue greater even than that of the Civil War, which continued us as one nation rather than two. The great conflict in which we are now engaged is a war for the democratization of the world, a war for peace!

We are passing through one of the great epochs of history, one of the mightiest struggles of civilization. It is a privilege to live in such an epoch; it is a duty to help the right in such a struggle!

Our loved country, greatest of the republics and chief exemplar of democracy, has joined the Allies against the common foe, and all its wealth of men and money and resource is pledged in honor with them to fight on, for years if need be, until the inevitable is achieved and the great Teutonic peoples are blest, as we are, with the control of their own government. That this may come, through internal dissension and the pressure of the Allies, before we can marshal our forces on the battle line, we must not assume. We cannot stand by while others fight out the struggle in which we too are now concerned. We must provide and, indeed, the administration is carefully planning, the rapid expansion of our sea power and merchant marine, and the training of a large army. Both of these undertakings throw a heavy responsibility upon the medical profession. Thousands of physicians will be needed for active service. They will be needed in the navy yards, on war, transport, and hospital-ships. In the army they will be needed in recruiting depots, training and concentration camps, in ambulance companies, field- and base-hospitals.

An army of one million men ought to have not less than seven thousand medical officers; there are but a few hundred in our regular army now. With the recent additions to the Medical Officers Reserve Corps it still numbers, we believe, much less than two thousand; it should be increased to twenty or thirty thousand. National Guard increments to be added to the federal force will need, of course, their proportion of medical officers. Dr. Frank F. Simpson, Chief of the Medical Section of the Council of National Defense, announces that about 350 additional officers are needed for the Naval Medical Corps, and several hundred for the Coast Defense Reserve Corps of the Navy.

The profession has been made fairly familiar with these needs through the newspapers and through the activities of the local (state and county) committees of the National Committee of American Physicians for Medical Preparedness. In this great world crisis upon which we have entered, it is the duty of every physician in the country to take stock of his talents and experience, of his physical fitness and his obligations, and to determine whether by reason of his age, his health, the demands upon

his earnings or his indispensibility in his community, he should remain at home to serve that community or give his services to his country elsewhere. Only young men are eligible to commission in the regular army Medical Corps, but in the Medical Officers Reserve Corps the age limit is fifty-five, and all physicians not older than that who are in good standing and of good health and have had proper clinical or laboratory experience will be welcome. Many of the older men of the profession, men of eminence and men of humbler reputation, are enrolled in the Medical Officers Reserve Corps and stand ready to be called, or have already been called, to active service. This should inspire their colleagues. It is especially our duty, both by example and by argument, to urge upon the young men just completing their hospital interneships, their immediate obligation to the country. They are most needed now. Service in the army for these young men, well trained, and as yet unembarrassed by the responsibilities of a practice and the support of a family, is not only an evident duty, it is a brilliant opportunity. Aside from the experience, a junior medical officer in the army (or the navy) receives $2,000 a year and "quarters"—which is more than most men earn their first year or two in medical practice. There is now an excellent opportunity for young physicians to enter the army, with exceptional prospects of early promotion. Those, however, to whom the career of an army surgeon does not appeal, should join the Medical Officers Reserve Corps, in which organization they would have no obligation to serve after the war without their consent.

Application blanks and full information can be secured by writing to the office of the Surgeon General of the Army, Washington, D. C. In those states, however, in which Medical Reserve Corps Associations have been formed, the officers of those associations have been empowered to receive and forward applications and to conduct physical examinations.*

Jonathan Letterman, medical director of the Army of the Potomac, conceived and established what is, essentially, still the system of caring for the wounded in battle. The greatest working medical library in the world, the greatest index of medical literature, are the monuments to an American army surgeon, John Shaw Billings. In peace and in war, the regular and the volunteer military surgeon, have written their names into American history and into the great accomplishments of American medicine. The profession today is ready, we are sure, to carry on the traditions that it has inherited. It has, too, the unique and comforting distinction that its country's call is not to destroy life but to preserve it.—W. M. B.

*The president of The N. Y. State Medical Reserve Corps Association is Major Henry C. Coe, M.O.R.C., 40 East Forty-first Street, New York City. New Jersey physicians may secure application forms from the president of the Medical Reserve Corps Division of that State, Major David Kraker, M.O.R.C., 236 Broad Street, Newark, or the secretary, Captain Joseph MacDonald, Jr., M.O.R.C., East Orange.

AMERICAN MEDICAL EDITORS' ASSOCIATION.

The annual meeting of the American Medical Editors' Association will be held at the Hotel McAlpin, New York City, June 4th and 5th, 1917, under the Presidency of Dr. George Morris Piersol, Editor of the *American Journal of the Medical Sciences.*

A very interesting program is now being prepared, and it is expected that the forthcoming session will be the largest in the history of the Association.

The forty-eighth anniversary of this society will be celebrated by a banquet on the evening of June 5th, at the Hotel McAlpin.

The meeting will be coincident in time and place with that of the American Medical Association.

The United States has joined the world war for democracy! YOUR help is needed.

Surgical Suggestions

Morphine is a life-saving drug in certain surgical complications. In post-operative pulmonary edema or congestion, for example, it usually accomplishes more than a whole battery of alkaloidal stimulants. In all other acute, threatening post-operative conditions in which the patient is restless, anxious, distressed, morphine, again, is of the utmost value, for it dulls the sensorium, stimulates and steadies the heart and brings the relief of often much-needed sleep.

Spina bifida occulta may exist without the usual external manifestations (lipoma, hypertrichosis). A bifidity in the lower lumbar or sacral arches is a not uncommon find in *x*-ray pictures of individuals who have no cord symptoms whatever. But it is also occasionally seen in those who have such cord symptoms as bladder or rectal incontinence or perforating ulcers of the foot, but no supraspinal lipoma, hair growth or nevus. An *x*-ray picture, therefore, may sometimes reveal the cause of a trophic disturbance, even when physical examination fails to do so.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

MOBILIZING THE MEDICAL PROFESSION.

The Council of National Defence is charged with the responsibility of coordinating the industries and resources of this country for the purpose of developing national security and promoting the general welfare. The medical profession is represented by Franklin H. Martin of Chicago on the "Advisory Commission to the Council," who thus becomes the chairman of a medical committee consisting of the Surgeon-Generals of the Army and Navy and the Public Health Service, together with the presidents or other high officers of numerous national medical organizations. For purposes of convenience a national committee was created by the Presidents of the American Medical Association, the American Surgical Association, the Congress of Surgeons of North America and the American College of Surgeons. By this centralized body, state committees were appointed which in turn are to select county committees whose specific efforts will be directed to the correlation of medical interests and activities with a view to building up a systematic plan of medical defence for the nation. The county committee becomes the unit agent to which duties are to be assigned by the higher administrative officers.

In the process of mobilization of American physicians many vital steps must be taken to secure the effectiveness of this branch of the military service without sacrificing the welfare of the industrial and civil population whose needs are not to be disregarded. A vast amount of work is requisite to coordinate the civilian physicians into a readily mobilizable adjunct of the army and navy.

Merely recruiting the physicians into the Officers' Reserve Corps fails to provide an adequate measure of medical defence. Cataloguing the activities of enrolled physicians according to their training, capabilities, interests and desires for service is as essential an inventory of medical strength as is an inventory of hopitals, convalescent homes, laboratories, dispensaries and social agencies available in meeting all possible contingencies during a state of actual warfare.

Insufficient stress had been placed upon the training of these men at present being enrolled into the Officers' Reserve Corps. The men formerly belonging to the Medical Reserve Corps have been taken over into the Officers' Reserve Corps. In offering commissions at the present time physicians who have hitherto devoted no time to the consideration of the problems of military medicine are receiving appointments which actually give seniority of rank over those men who for the past few years have been giving themselves to the organization and up-building of a useful medical reserve corps. The only type of medical officer who can be of maximum service at this time is the trained officer. To scatter throughout the army physicians whose chief claim to rank lies in the fact that they possess friends of political weight is to weaken the system of appointment and to decrease the enthusiastic support of those whose inclinations, interests, and desires have been manifest during several years.

It may be urged that many of the physicians to be appointed to the medical reserve will have achieved their honors as the result of examination. Book knowledge, however, cannot outweigh the practical experience of those who possess familiarity with the organization and duties of the medical department of the army and navy.

While it is true that the diseases of soldiers do not differ particularly from those existent in civil life and while the surgical procedures requisite for the care of the wounded vary principally in degree and severity, and treatment must be altered by the exigencies of military operations and limitations, the civil training of physicians does not afford the type of education productive of an efficient medical officer for the army or navy. Book knowledge alone is insufficient to afford the initiative and resourcefulness required for caring for the health of troops in camps or on the march. It fails to yield a confident and capable administrator of ambulance companies, field hospitals, evacuation hospitals, quarantine stations, medical supply depots or laboratories. Few men today are enrolled with adequate training to inspect and supervise the quality of food and water or to exercise military judgment in rationing an army, though of course the latter is largely dependent upon the efficiency of the commissary department. Numerous problems involving medicine, surgery, sanitation and hygiene arise wherein the medical officer becomes the authoritative advisor of the officers of the staff and the line.

During time of peace an army medical school has been maintained for the purpose of affording necessary instructions to the officers of the medical department, who are all graduates from medical schools. If during the time of peace such careful training is deemed of importance, how much more serious does this training become in the face of an actual need for efficient medical officers.

The Manual of the Medical Department officially states the duties of the medical department to be "the institution of sanitary measures to preserve the health of the troops and inhabitants of occupied territory, the care of sick and wounded, their transportation, etc., in the order named." This simple description by no means indicates the duties with which medical officers must acquaint themselves.

It would seem imperative that the mobilization of medical officers should be prompt in order that a campaign of education might be instituted at once to develop the personnel capable of performing the services required and demanded. The appointment of medical officers should be made at once and duties should be assigned immediately with a view to securing familiarity with the numerous forms of red-tape with which administrative work is always tied. It would not be necessary to insist upon full time service until the actual need arose to be of service. The Government should begin the training of the physicians with a view to making them more useful in the national defence.

It is obvious that the utilization of a large number of physicians along military lines will require a redistribution of physicians in order to maintain upon a high plane the medical and surgical service necessary to meet the demands of the civil population. Modern wars are no longer fought by personal combat, but depend upon the organized fighting of nations. The supplies to be used by the military and naval forces can be forthcoming only by the maintenance of the health and welfare of the industrial forces engaged in their manufacture. A plan of medical preparedness which fails to take cognizance of the quasi-military needs of the general population may lead to dangerous undermining of the general welfare of the nation and actually weaken its resourcefulness and military strength.

In order to effectively prepare the nation along medical lines every physician should be called upon for service to the nation in some capacity, however humble and seemingly insignificant.

In the scheme of "medical preparedness," in the "mobilization of the profession," where can YOUR training and experience be used to most advantage?

Book Reviews

International Clinics. A Quarterly of Illustrated Clinical Lectures and especially prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and other topics of interest to students and practitioners, by leading members of the medical profession throughout the world. Edited by H. R. M. Landis, M.D., Philadelphia. *27th Series*, 1917. *Volume I.* Octavo, 305 pages; illustrated. Philadelphia & London: J. B. Lippincott Company, 1917. $2.00.

This issue of *International Clinics* contains a 100-page review of the progress of medicine (including surgery) during 1916 by Frank A. Craig and John Speese, of Philadelphia; and the following original articles: The Medical Treatment of Gastric and Duodenal Ulcer, by B. B. Vincent Lyon; The Treatment of Epithelioma by Radium, by Russell H. Boggs; The Medical Treatment of Poliomyelitis, by Curran Pope; Syphilis as an Etiological Factor in Laennec's Atrophic Cirrhosis of the Liver, by Douglas Symmers; Personal Researches on the Nature of Chloromata, by Max Askenazy; On Aneurismal Obstruction of Vena Cava Superior with Special Reference to the Caval Syndrome, by P. G. Skillern, Jr.; Some Adenomatous Tumors of the Abdominal Viscera, by F. Parkes Weber; The Electronic Reactions of Abrams, by Albert Abrams; Acne Necrotica, by Frederick Gardiner; The Tangled Skein (Neglected Psychopathics), by J. Madison Taylor; A Study in Superstition, by J. P. H. Murphy; Health Efficiency of Workers due to their living conditions, by H. R. M. Landis; The Treatment of Dislocations and Fractures of the Outer End of the Clavicle, by F. M. Cadenat; Local Anesthesia in Surgery of the Colon and Rectum, by William M. Beach; and Congenital Talipes Equinovarus with Report of a Case of Bilateral Symmetrical Talipes in Twins, by William Barnett Owen.

An Inquiry Into the Principles of Treatment of Broken Limbs. By William F. Fluhrer, M. D., Consulting Surgeon to Bellevue and Mount Sinai Hospitals. Octavo; 128 pages; illustrated. New York: Rebman Company, 1917.

Those who enjoyed the privilege of working with Fluhrer at Bellevue or Mount Sinai Hospital many years ago carry with them a lasting impression of his skill, his remarkable patience, his courteous manner, his distinctive personality. This publication recalls to mind his various contributions to surgery—his tin-strip method of rapidly immobilizing fractures, his technique of urethrotomy for stricture, his early prostatectomies, the Fluhrer probe, the Fluhrer tunnelled-probe-pointed-director catheter, Fluhrer crochet bone drill, etc.

Some of these inventions are referred to in this book. The author calls it "a philosophico-surgical essay." It is also written in a spirit of reminiscence, in which respect, too, it is very interesting.

The greater part of the book is devoted to a description of the tin strip method of fracture immobilization devised by the author in the early seventies, and to the principles that underly it. Added to this are "Surgical Notes" upon other subjects, e. g., a description of the manner in which Fluhrer abolished septicemia in two New York reception hospitals—a vivid picture of conditions in Bellevue Hospital in pre-antiseptic days; a discourse upon the management of septic wound complications; the considerations of increased "scope" that led him to devise some of the surgical instruments above referred to.

Fluhrer's tin strip method of splinting fractures is a most useful and practical procedure that every surgeon should be familiar with. To those who are not we commend the reading of this philoscophico-surgical essay.

Surgery, with Special Reference to Podiatry. By Maximilian Stern, M. D., and Edward Adams, M. D., Professors of Surgery, School of Chiropody of New York. Edited by Maurice J. Lewi, M. D., President, School of Chiropody of New York. Octavo; 278 pages. New York: The School of Chiropody of N. Y., 1917.

This volume is the first of a contemplated series of books to comprise "a system of podiatry," for students of chiropody.

It is a well-conceived manual of surgical principles and of such elementary surgery as is desirable in the instruction of chiropodists. Physiological, pathological and bacteriological fundamentals, general surgical methods and specific procedures are set forth very succinctly and very clearly.

American Public Health Protection. By Henry Bixby Hemenway, A. M., M. D., Author of The Legal Principles of Public Health Administration, etc. Octavo; 271+12 pages. Indianapolis: The Bobbs-Merrill Company.

The protection of the public health is no longer an academic question. It is a practical problem, the solution of which lies within the power of the general public. Unfortunately, our medical schools give inadequate attention to the science of prophylactic medicine, though in a few institutions courses in public health have been instituted in recognition of the general need for such information in the medical profession.

The purpose of the author is to make manifest his idea as to what a health department should be. He does not offer a manual of hygiene but a careful consideration of the practical questions involved in establishing public health work upon a sound rational basis that will advance the interest of government and citizenry.

After discussing the history and development of public health service through departments in the United States, the author points out that the great failure in health administration has been the lack of adequate compensation for those serving the public in advisory or direct capacity as health officers.

He recognizes that the national government had until very recent times taken few steps for the protection of the health of the citizens. He properly notes that individual States acting under the police power enact conflicting

health laws which cannot be harmonized or have not been harmonized through any national health department.

His discussion of the existing national health agencies is well presented and points out the advantages and disadvantages of the lack of harmony or co-operation among these various national departments.

The general basis of his book depends upon the recognition that sanitation and hygiene has become a separate profession, and that medical practitioners have not had the training to warrant them to become authorities on modern sanitation. He demands for the public health worker training in zoology, sociology, sanitary engineering, veterinarian medicine, vital statistics, and public health juris-prudence, all of which are involved as important portions of the public health official's education.

There would be general agreement with his demand that medical practitioners serving as public officers of health should receive adequate compensation and should not be expected to sacrifice himself, his family, or his practice without a proper quid pro quo.

The chapter dealing with Social and Economic Conditions points out the various changes which have influenced public health work health administration and the development of laws relating to the medical profession and the laity as factors in securing a higher standard of public health service. Similarly, he discusses in a virile way the changes in health administration required by the advances in medical science, particularly as related to malaria, typhoid fever, and the numerous infections transmitted by animals.

His demand for medical inspection of schools with an increased efficiency on the part of the inspectors is a reasonable forecast of what is to be expected within a comparatively few years. The point of view that inculcation of health is to be the basis of school work is far more acceptable than the present theory that the function of the medical inspector is merely to discover diseases.

With the acceptance of Dr. Hemenway's demand for a thorough, complete and scientific organization of health departments, there is naturally involved the readjustment of former conditions, wherein the preparation of health officers becomes of serious importance. His demands upon our State universities to aid in the work of educating our guardians of health merits serious attention. It may shock physicians to read "as a rule little assistance can be reasonably expected from medical schools," "the degree of doctor of public health should never be considered as an additional degree in medicine."

His conclusion that public health is a new science and a new profession is undeniable, and his presentation of his reasons therefor in book form may be regarded as a distinct contribution to the theme which he has made the title of his excellent discussion.

The Bulletin of the Department of Public Charities, City of New York. Vol. 1. No. 1. October, 1916. $2.00 per year.

This is the first issue of a quarterly scientific bulletin published by the Department of Public Charities, New York City. It is devoted to articles by members of the attending and resident staffs of the various hospitals in the department, and is edited by Dr. Orrin S. Wightmann.

What to Eat and When. *Fourth Edition.* Duodecimo; 366 pages; illustrated. **Let's Be Healthy in Mind and Body.** Duodecimo; 334 pages. **The Woman Worth While.** Duodecimo; 217 pages. By SUSANNA COCROFT, New York: G. P. PUTNAM'S SONS, 1916. Per set, $3.95, postpaid.

These three volumes by Susanna Cocroft, exponent of physical culture and widely known in her very useful sphere, make excellent reading for the laity and may well be recommended by the physician. The title of What to Eat and When, now in its fourth edition, explains its contents. Let's be Healthy in Mind and Body describes for the layman some of our various physiological processes, and the means for avoiding their abuse of those functions. The Woman Worth While ought to help the "nervous," irritable, unhappy female who has no system in her housekeeping or in the care of her children and finds little joy in either.

Progress in Surgery

A Résumé of Recent Literature.

Lesions of the Fifth Lumbar Vertebra.. L. C. KINNEY, San Diego, *Medicine and Surgery,* March, 1917.

According to Kinney, the fifth lumbar vertebra is subject to many congenital anomalies; e. g., partial or complete fusion with the sacrum; Enlargement of the transverse processes and articulation with the sacrum or ilium or both, etc. These abnormalities render this vertebra peculiarly liable to injury, and especially the ligaments of this vertebra. When such injury occurs, a disability follows, which is peculiarly liable to be persistent. Kinney reports four such cases. The paper is inconclusive in regard to the proper treatment of such cases. In addition to the plaster jacket, the author suggests surgical measures, which, however, were not carried out in his cases.

Chronic Medullary Abscess of the Long Bones. Its Clinical and Roentgenographic Features. Its Treatment by Simple Trephining. WALTER M. BRICKNER, New York. *Annals of Surgery,* April, 1917.

The literature reveals but few references to any type of chronic bone abscess other than that of the bone substance itself (cancella) generally known as "Brodie's abscess." Very few authors indicate—and some of them only vaguely—that there also may occur a chronic accumulation of pus, large or small, wholly within the medullary cavity.

Brodie's abscess of the bone substance, is readily recognized in the roentgenogram as a translucent area surrounded by the shadow of dense bone. In the region of the abscess this productive ostitis may cause much thickening of the bone, and often associated with it is a localized periostitis. The *medullary* abscess, like acute suppuration of the bone marrow, can not be recognized, as such, roentgenographically. The roentgen ray appearance is that of an osteo-periostitis or of a bone that has been the seat of an osteomyelitis. Although the diagnosis therefore can not be made by the roentgenographer, it can be made by combining his findings with the clinical observations. A suggestion for a roentgen ray diagnosis can be found in the character of the ostitis as it appears in the picture; when the abscess is medullary there is sometimes but little external thickening of the bone; the ostitis then spreads centripetally, encroaching upon and sometimes in one or more places completely obliterating the medullary cavity. This internal thickening is by dense dry bone. Such an ostitis or osteo-periostitis when, by its appearance or otherwise, syphilis can be excluded, and when there is no evidence of necrosis or cortical abscess, would justify the roentgenographer in suggesting the possibility of pus in the marrow cavity.

The chronic and medullary abscess of a long bone, uncomplicated by any active process, is not associated with fever, in the author's experience.

The sole symptom is severe, more or less continuous pain in the affected portion of the extremity. This pain may radiate, as from the arm into the forearm or from the thigh into the leg. It may thus be mistaken for neuritis; and for "neuritis" or "rheumatism" these patients may be treated for a long time before their condition is recognized.

The sole constant objective finding is localized bone tenderness. There may be palpable bone thickening.

The roentgenographic appearance is that of an osteo-periostitis or that of a former osteomyelitis.

This triad-severe pain, localized bone tenderness, and the roentgen picture—make the diagnosis of chronic medullary bone abscess, if the patient is afebrile. The same pain and tenderness are produced by a chronic abscess of the bone substance, but the roentgenographic appearance will distinguish it.

The clinical course of such a medullary accumulation of pus is essentially chronic. It would seem that it causes neither fever nor prostration. The productive ostitis or osteo-periostitis is, perhaps, a reactive rather than a bacterial inflammation. Prompt cessation of pain and ten-

derness follows the simple evacuation of the pus. There appears to be little or no tendency to bone necrosis; and chronic medullary abscess must not be confused with "ostitis interna" as described by Billroth or the "central necrosis" of Keen, although it may have the same origin. Nor, it seems, is there a tendency to perforation.

Brickner reports three interesting cases. In two there was a large chronic medullary abscess of the humerus. These were treated by simple evacuation through a small drill hole. In both, the pus was found sterile. The third case was of a small chronic medullary abscess of the femur, evacuated through an osteo-periosteal flap. All three cases were immediately relieved and returned to work, healed, in two weeks.

Chronic medullary abscesses are probably most often residual from an "ostcomyelitis." Perhaps, however, they may develop sometimes from a pure infection of the bone marrow, either hematogenous or, as from a bullet or a surgical instrument, direct.

In spite of pre-conceived notions, evacuation of the chronic medullary abscess through a drill or trephine-hole in the bone seems to Brickner the method of choice. Admittedly such early healing as he secured may not always follow. As a result of secondary infection, or perhaps from the awakened activity of dormant organisms, continued suppuration or a localized bone necrosis may develop. But if these do not subside spontaneously they can be dealt with secondarily by an operation probably much less extensive than a primary exposure, by bone removal, of the entire pus cavity, sometimes a formidable operation that entails prolonged hospital care and loss of employment, and perhaps much permanent disability. Even in acute osteomyelitis it is not always necessary to remove bone over the entire length of the suppurating medulla; if it appears viable and sound, several inches of the shaft may be left undisturbed after evacuating its medullary pus with a spoon.

After trephining a chronic medullary abscess the cavity probably fills with granulation tissue. Such filling is apparently not necessary to the healing over of the soft parts, however. In selecting the spot for draining the bone, the point of maximum tenderness is the best guide. The roentgenogram is sometimes helpful in indicating a level where the medullary space would be found obliterated. The following technic is suggested, viz., to introduce nothing into the cavity except the single instrument by which it is opened; to insert a small gauze, rather than a tube, drain down to but not into the bone, with which to provide for the escape of any remaining pus, of blood and of serum; and to remove this—preferably without replacement—as soon as the discharge has practically ceased.

Dupuytren's Contraction of the Palmar Fascia. J. HUTCHINSON, London, *Lancet*, Febuary 24, 1917.

Hutchinson seems at last to have found the solution to the cure of this obstinate malady. The reason for the contraction is not the flexor tendon or intraarticular adhesions as formerly supposed.

The true reason is that, owing to the second phalanx being extremely flexed so that its base is pressed against the neck of the first phalanx, and, owing to this position being kept up during many months or years, the glenoid ligament in front of this joint, as well as the lateral ligaments, become shortened and incapable of extension.

The only way to overcome this obstacle is to excise the head of the first phalanx. Briefly the method is as follows:—

1. Through a palmar incision the bands of contracted and thickened fascia are dissected out, including their prolongations in front of the first phalanx. The palmar wound or wounds are closed with the finest black silkworm-gut. The finger still remains flexed at the first interphalangeal joint.

2. The hand is turned over so that the dorsal surface is uppermost, a semilunar incision is made over the first inter-phalangeal joint, the extensor tendon divided, the head of the first phalanx cleared to its neck, the latter cut across and the head dissected out.

3. The extensor tendon is slightly shortened and its two ends united, preferably with fine kangaroo tendon or Japanese silk, and the small dorsal incision (which is, of course, quite separate from the palmar one) is then sewn up. The finger should now become perfectly straight (or nearly so) *without any tension whatever.*

4. No splint is required in the after-treatment; the gauze dressing is a sufficient support. Gentle active and passive movements should be resorted to within the first few days. *No digit should be allowed to stiffen.*

Hutchinson reports results and shows photographs to prove his contention.

The Destruction of Angiomas and Other New Growths by the Injection of Quinine and Urea Hydrochloride. W. W. BABCOCK, Philadelphia, *New York Medical Journal*, March 3, 1917.

With a hypodermic syringe Babcock injects either a 33 or a 50% solution directly into the tumor, taking care that the infiltration is not too wide. A submucous or subcutaneous necrosis takes place resulting in scar formation and disappearance of the tumor. Babcock has used this method in a number of non-malignant conditions, e. g., angiomas warts, port-wine stains, urethral carbuncles, etc. He suggests the use of this method in many inoperable superficial cancers. The injection is followed by severe pain which, however, lasts but a short time and is followed by analgesia.

Nerve Grafting as a Means of Restoring Function in Limbs Paralyzed by Gunshot or Other Injuries. A. W. MAYO-ROBSON, *British Medical Journal*, Jan. 27, 1917.

Mayo-Robson reports two cases of nerve grafting between ends of divided nerves with complete restoration of function. In one case both median and ulnar nerves were united by inserting portions of the sciatic nerve and fraction of the spinal cord of the rabbit. Six years later the functional result was almost perfect. In the present war Mayo-Robson has been successful with this procedure in a large number of cases.

The Operative Treatment of Hydrocephalus: A preliminary report of 41 patients. WILLIAM SHARPE, New York, *American Journal of Medical Sciences*, April, 1917.

Sharpe holds that, contrary to the prevalent belief, the majority of cases of hydrocephalus are of the external type and not of the internal. The youngest patient was 10 days old; the oldest 4. The younger the patient, the better will be the functional end results, because the effects of pressure upon the brain have not yet developed. The young patients also stand the operation better than the older ones. The operation consists in inserting six linen threads into the ventricle in the internal type and into the subarachnoidal and subdural spaces in the external type: the ends are brought out through the temporal muscle and fascia beneath the scalp in a stillate manner. Of the forty-one patients, thirteen died. In the remaining twenty-eight the results are "encouraging." All have been improved and are improving. The test evidence that improvement has resulted is shown in the fact that in all the changes in the optic disc have improved.

Intrathoracic Goiter. F. H. LAHEY, Boston, *Boston Medical and Surgical Journal*, March 8, 1917.

Intrathoracic goiters are either adenomata or cysts originating in one of the lower poles or isthmus of the thyroid, and gradually enlarging downward into the thorax along the path of least resistance. The symptoms are: a feeling of pressure beneath the sternum, on swallowing, huskiness of the voice; dyspnoca, and intermittent attacks of suffocation. Intrathoracic goiter should be suspected in some cases of asthma. On physical examination, there is abnormal dulness over the upper portion of the sternum; *x*-ray reveals a tumor mass in this situation and there is inability to feel the lower pole of one of the lobes of the thyroid. The latter sign is especially valuable for diagnosis. The difficulty of removal of these goiters depends entirely upon how deep the mass is and whether the upper opening of the stomach is large enough for the tumor to be delivered. In many instances the opening must be enlarged by removing the upper portion of the sternum.

These tumors must always be removed en masse and not by morcellement.

Tubercular Cervical Adenitis in Children. W. E. LADD, *Surgery, Gynecology and Obstetrics,* April, 1917.

During the past five years, Ladd operated on 159 cases of tuberculous cervical adenitis in children at the Children's Hospital of Boston and in his private practice. He was able to follow up 130 of these children for periods varying from six months to five years. He lost only one case, and that from meningeal complications. Ladd lays great stress on the importance of early operation when the glands are still discrete and when no abscess has as yet formed; also it is important to remove the portal of entry. This in his experience has been the tonsil chiefly. Infested teeth, adenoids, facial or nasal lupus may also be the primary focus of infection. In over 90 per cent. of his operatio cases he got primary union and in the same percentage out of a series of 119 cases there was no further evidence of tuberculosis at examinations made from one to five years after operation. He prefers the transverse incision in one of the natural folds of the neck. This gives the best cosmetic result. The type of infection appears to be from the bovine tubercle bacillus. Hence it would be desirable to secure milk from non-tubercular milk supplies. While other methods than the radical removal sometimes result in cure, they require a longer time and are less certain.

Tissue Tone as an Index of Vital Resistance. H. R. HUGGINS, *American Journal of Obstetrics and Diseases of Women and Children,* April, 1917.

Huggins reviews several personal cases of fatalities following operation, particularly when the condition is one of prolapse of the uterus. These fatalities were due in his opinion to insufficient muscular cardiac "horse-power." He recommends that any attempt calculated to estimate the amount of stress a given patient will stand should be made before operation in elective cases. The resistance of the patient should be increased by prolonged rest in bed before operation, or any suitable measures which will insure against post-operative shock and asthenia. The electrocardiogram and frequent blood pressure tracings are here of greatest help.

The Simulation by Corpus Luteum and Retention Cysts of the Ovary of Ectopic Pregnancy and Early Uterine Abortion, a Clinical and Pathological Study. I. C. RUBIN, *Surgery, Gynecology and Obstetrics,* April, 1917.

Delayed menstruation in married women, while not of uncommon occurrence, is usually regarded in relation to pregnancy. This is not always the case. Not infrequently physical examination reveals a uterus changed in consistence and even larger than the average non-pregnant uterus is, making the diagnosis of early pregnancy strongly presumptive. Occasionally also an extra-uterine mass may be palpated in addition to the enlarged uterus. In spite of all this the menstrual flow delayed several days to a few weeks may set in and differs apparently in no way from the usual menses for that particular individual. In a certain number of cases with this symptom-complex, there may in addition be the symptom of pain referred to one or the other side, dizziness or even faintness and severe abdominal cramps. In other words there may be present the essential points in the history and physical findings of the patient to lead to the diagnosis of an ectopic pregnancy. Occasionally, the cystic mass may be unmistakably ruptured during the physical examination, thus further simulating a ruptured ectopic gestation sac. Yet neither in the subsequent course, nor at laparotomy is an ectopic pregnancy proved. Instead a retention cyst of the ovary varying in size from a plum to a small orange is the only abnormal finding. This cyst may be a simple retention cyst histologically with or without lutein cells, or it may be a genuine corpus lutein cyst. These arise either as a result of early death of an intra or extra-uterine embryo, the subjective symptoms being wholly due to the gestation itself; or arising as a result of trauma or degenerative changes in the ovary, the corpus luteum cyst may induce secondary changes within the uterus, enlarging it, softening it, prolonging the decidual (pre-menstrual) phase, and inhibiting the onset of the menses.

From an analysis of the histologic findings in the cases personally encountered and operated upon, Rubin concludes that it appears that corpus luteum cysts and retention cysts of the ovary may simulate early terminated intra or extra-uterine pregnancy without either of these conditions actually having been present. On the other hand, it is more likely that in the majority of instances these retention cysts result secondarily through early embryonal death whether the impregnated ovum lodged within the uterus or within the tube. The ovum is in these instances disintegrated and absorbed and restitution (involution) takes place without the external or internal hemorrhage which we are accustomed to see in uterine or ectopic abortion. In all probability a great many non-tragic ectopic pregnancies terminate in this way.

The Advantages of Conservative Surgery in Operations for Diverticula of the Descending and Pelvic Colon. J. W. KEEFE, Providence, *Boston Medical and Surgical Journal,* Feb. 22, 1917.

1. Our knowledge of the origin of intestinal diverticula is meager, and but little unanimity of opinion exists relative to the etiological rôle played by the several factors mentioned as causes.

2. The symptoms are definite and characteristic, and failure to recognize the condition arises more from a lack of knowledge of it and a failure adequately to realize its importance, rather than from any inherent difficulty in the diagnosis.

3. Inasmuch as the location of the region involved and the period of life at which the condition occurs are identical with those of malignant growths, the differential diagnosis between these two conditions becomes difficult and is of paramount importance. Other conditions to be differentiated are: left-sided appendicitis, and tuberculous and luetic growths.

4. The *x*-ray examinations afford a most valuable aid in diagnosis and are of especial value in differentiating between diverticulitis and carcinoma.

5. As a result of infection through intestinal diverticula, grave, and not infrequently fatal, complications arise, namely:

(*a*) Chronic extramuscosal inflammation, frequently resulting in tumor formation and simulating carcinoma.
(*b*) Peritonitis resulting from the perforation of a diverticulum.
(*c*) Abscess formation.
(*d*) Intestinal obstruction, due to adhesions of the inflammatory mass to contiguous structures.
(*e*) Fistulae and fistulous tracts, particularly between intestine and urinary bladder.
(*f*) Chronic mesenteritis.
(*g*) Metastatic suppuration in the liver.
(*h*) Malignant changes resulting in carcinoma.

6. In deciding on the type of operation to be performed in a case of diverticulitis, the one fundamental principle which, to the exclusion of all others, should guide the surgeon, should be that of conservatism. With this serious surgical condition he should aim, not at completeness and a display of surgical technic, attempting to do a brilliant and radical operation with great hazard to the patient; but, rather, should strive to preserve life through the gravest part of the illness, employing such palliative procedures as draining an abscess, performing a colostomy, or adopting, in suitable cases, the two-stage operation.

Thousands of doctors in Europe, Canada and Australia have sacrificed their practices—many of them their lives—at the call of their country. YOUR country is calling now!